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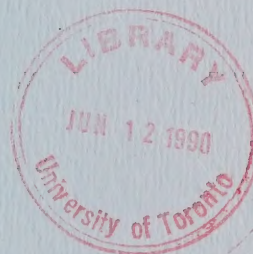
Ontario

ENVIRONMENTAL ASSESSMENT BOARD

VOLUME: 209

DATE: Thursday, May 31, 1990

BEFORE:
A. KOVEN, Chairman
E. MARTEL, Member



FOR HEARING UPDATES CALL (TOLL-FREE): 1-800-387-8810

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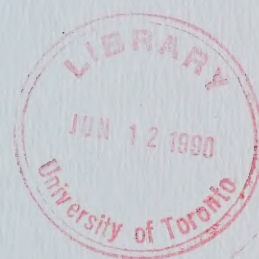


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HEARING ON THE PROPOSAL BY THE MINISTRY OF NATURAL
RESOURCES FOR A CLASS ENVIRONMENTAL ASSESSMENT FOR
TIMBER MANAGEMENT ON CROWN LANDS IN ONTARIO

IN THE MATTER of the Environmental
Assessment Act, R.S.O. 1980, c.140;

- and -

IN THE MATTER of the Class Environmental
Assessment for Timber Management on Crown
Lands in Ontario;

- and -

IN THE MATTER OF a Notice by the
Honourable Jim Bradley, Minister of the
Environment, requiring the Environmental
Assessment Board to hold a hearing with
respect to a Class Environmental
Assessment (No. NR-AA-30) of an
undertaking by the Ministry of Natural
Resources for the activity of timber
management on Crown Lands in Ontario.

Hearing held at the offices of the Ontario
Highway Transport Commission, Britannica
Building, 151 Bloor Street West, 10th Floor,
Toronto, Ontario, on Thursday, May
31st, 1990, commencing at 8:30 a.m.

VOLUME 209

BEFORE:

MRS. ANNE KOVEN
MR. ELIE MARTEL

Chairman
Member



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I N D E X O F P R O C E E D I N G S

<u>Witness:</u>	<u>Page No.</u>
<u>MAXWELL McCORMACK,</u>	
<u>RODERICK CARROW,</u>	
<u>ROBERT TOMCHICK,</u>	
<u>WILLIAM SMITH,</u>	
<u>MURRAY FERGUSON,</u>	
<u>PHILIP BUNCE,</u>	
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I N D E X O F E X H I B I T S

<u>Exhibit No.</u>	<u>Description</u>	<u>Page No.</u>
1204	MNR Interrogatory Question No. 9 and answer thereto re OFIA/OLMA Panel No. 7.	37332
1205	Revised coy of Table 14 (subject to proof).	37343
1206	Four reports of the Annual Pest Control Forum for the years 1981 to 1984 (A-D).	37344
1207	Article entitled: Two-Year Effects of Bacillus Thuringiensis Treatment On Spruce Budworm, Choristoneura Fumiferana (Lepidoptera: Tortricidae) by Dimond and Spies, 1981.	37423
1208	Article entitled: Long Term Study of the Effectiveness of Aerial Application of Bacillus Thuringiensis - Acephate Combinations against the Spruce Budworm, Choristoneura Fumiferana (Lepidoptera: Tortricidae) by O.N. Morris, 1977.	37425
1209	Excerpt from a paper entitled: Microbial Insecticides in Canada: Their Registration and Use in Agriculture, Forestry and Public and Animal Health, prepared by Special Committee of the Science Policy Committee, Entomological Society of Canada, June, 1986.	37429
1210	Excerpt from Hansard dated October 19, 1989.	37503

1 ---Upon commencing at 8:35 a.m.

2 MADAM CHAIR: Good morning. Please be
3 seated.

4 Good morning, Ms. Kleer.

5 MS. KLEER: Good morning.

6
7 MAXWELL McCORMACK,
8 RODERICK CARROW,
9 ROBERT TOMCHICK,
10 WILLIAM SMITH,
11 MURRAY FERGUSON,
12 PHILIP BUNCE,
13 GEORGE STANCLIK, Resumed

14 CONTINUED CROSS-EXAMINATION BY MS. KLEER:

15 Q. Perhaps I can ask if Mr. Tomchick or
16 Dean Carrow was able to obtain the information on the
17 matrix from the Ontario Forest Research Institute.

18 MR. TOMCHICK: A. We're working on it.
19 We haven't been able to get it yet.

20 Q. All right. This morning I am going
21 to be focusing a lot of my questions on Table 14 which
22 is at page 181 of the witness statement, and we will be
23 looking at the issues relating to the foliage
24 protection standards and the effectiveness of B.t as
25 compared to chemicals.

26 Dean Carrow, did you prepare Table 14 or
27 was that prepared by any of the other witnesses?

28 DEAN CARROW: A. No, I prepared it, Ms.

1 Kleer.

2 Q. All right. These results that are
3 set out in Table 14 are based on the standards as used
4 by New Brunswick set out in Carter's paper; is that
5 correct?

6 A. Table 14 was prepared really to use
7 as an example the value of using a numerical standard
8 and for the purpose of assessing the overall rate of
9 success of a spray program involving whatever materials
10 are used in that particular program from year to year.

11 In this particular table, what I did was
12 to use the standards that are used by New Brunswick as
13 a point of comparison.

14 Q. Now, Carter's paper we saw formed
15 part of Exhibit 1136; is that correct? It's MNR
16 interrogatory No. 7 on Panel 7. I would just like to
17 take a look at that for a moment.

18 MADAM CHAIR: Excuse me, what was the
19 exhibit number?

20 MS. KLEER: Exhibit 1136 and in that MNR
21 interrogatory No. 7.

22 MADAM CHAIR: Thank you.

23 MS. KLEER: Attached to that
24 interrogatory are two papers -- or interrogatory answer
25 are two papers, the first of which is Protection

1 Spraying Against Spruce Budworm in New Brunswick 1988
2 and that's prepared by Mr. Carter.

3 Q. If we could you turn to page 9 of
4 that paper and the first paragraph is what I would like
5 to look at.

6 Dean Carrow, to the best of your
7 knowledge, New Brunswick's 50 per cent current year's
8 foliage protection standard is for spruce and it's only
9 for red and black spruce, is that correct, not for
10 white spruce?

11 DEAN CARROW: A. Yes, that's correct
12 because the particular species which occur in New
13 Brunswick are red and black spruce.

14 Q. Are you aware of any protection
15 standard specific to white spruce?

16 A. In the Province of New Brunswick?

17 Q. In the Province of New Brunswick or
18 in the Province of Ontario. I will get to Quebec
19 later.

20 A. Well, the only standard that I am
21 familiar with in Ontario is the one that was provided
22 by Mr. Churcher in his evidence which related to the 25
23 to 75 per cent foliage protection standard.

24 Q. I take it, then, you're not
25 suggesting that this standard that is used in New

1 Brunswick ought to be applied for white spruce in
2 Ontario?

3 A. No, I'm not suggesting that and in my
4 evidence I made that point quite clearly, that in
5 fact -- the point simply was that New Brunswick had
6 adopted a specific numerical standard by which they
7 could assess the relative success or failure of the
8 program, and our evidence is that Ontario should adapt
9 some numerical standard which would be appropriate for
10 the circumstances.

11 Q. All right. And New Brunswick's
12 standard for balsam fir foliage protection is to
13 protect 60 per cent - I just want to get this clear on
14 the record - of current year's growth; is that
15 correct--

16 A. Yes.

17 Q. --for balsam fir?

18 A. And if I could just take the liberty
19 to distinguish the language on this, Ms. Kleer, I find
20 there is understandable confusion because the terms are
21 so similar.

22 The objective is to preserve 60 per cent
23 rather than protect, so I think if we try to use that
24 it will make this particular discussion a little easier
25 to understand. So, in essence, what New Brunswick is

1 trying to do is to retain or preserve 60 per cent of
2 the current year's needles or growth; in other words,
3 conversely, they are not willing to tolerate more than
4 40 per cent loss of the current year's growth.

5 Q. Now, as your evidence indicated,
6 Quebec's objective, regarding of species type, is to
7 achieve at least 30 per cent protection or
8 preservation, rather, of new foliage; is that right?

9 A. Well, that's where the difficulty
10 comes in this language. If you look carefully at
11 Quebec standards, it is 30 per cent foliage protection,
12 not preservation and foliage protection in Quebec is
13 the product of a fairly simple arithmetic calculation
14 which involves a comparison of the level of defoliation
15 on the sprayed trees or sprayed areas compared to the
16 level of defoliation on the unsprayed or control areas.

17 So that what they are trying to do with
18 that particular calculation is to measure the amount of
19 improvement they've gained through the treatment alone;
20 whereas, the New Brunswick approach is simply to
21 measure -- make an absolute measurement of the amount
22 of foliage lost regardless of what's happening in the
23 untreated areas.

24 Q. All right. Thank you for that
25 clarification.

1 I would like to turn for a moment to
2 Louis Dorais' paper which is also part of Exhibit 1136,
3 MNR No. 7, which sets out the 30 per cent Quebec
4 standard -- protection standard. Now, do you have that
5 in front of you?

6 A. Yes, I do.

7 Q. In Dorais' view and from an
8 entomologist's perspective -- is Mr. Dorais an
9 entomologist; are you aware of that or not?

10 A. Yes, he is a forester and an
11 entomologist.

12 Q. All right.

13 MR. MARTEL: Can I have the page number
14 again, please.

15 MS. KLEER: Sorry, it's the first -- it's
16 Exhibit 1136, MNR Interrogatory No. 7. I don't have a
17 paginated 1136, I apologize.

18 DEAN CARROW: Is it the first page,
19 Effectiveness According..."

20 MS. KLEER: Yes.

21 DEAN CARROW: The heading is
22 Effectiveness According to an Entomologist.

23 MS. KLEER: Q. Now, would you agree with
24 me that the paper states that Dorais' view as an
25 entomologist is that a 30 per cent protection standard

1 can be considered operationally acceptable?

2 I believe that language is used in the
3 first paragraph of page 1 of Dorais' paper.

4 A. Yes, and he is referring specifically
5 to Quebec, of course. For their conditions they regard
6 that as an acceptable standard of protection.

7 Q. In your opinion, is that an
8 acceptable standard for Quebec, or are you not familiar
9 with that?

10 A. I'm sorry, I really wouldn't be in a
11 position to answer one way or the other on that for
12 Quebec.

13 Q. Now, if we can turn back for a moment
14 to Carter's paper and again to page 9. Now, it says
15 there in the second sentence:

16 "The stated objective for annual
17 protection..."

18 They use the word protection, but I take
19 it that is something different?

20 A. Yes.

21 Q. "The stated objective for annual
22 protection in New Brunswick is to retain
23 60 per cent or more of the current year's
24 needles on balsam fir and 50 per cent or
25 more on red, black spruce."

1 Now, does this statement appear to be
2 based on policy considerations or is it based on a
3 scientific consideration of growth needed to achieve an
4 acceptable level of annual incremental volume increase?

5 A. It's rather an arbitrary selection of
6 numbers, Ms. Kleer. In my evidence I pointed out that,
7 in fact, I think the origin of those figures, as I
8 understand it, are really based on two factors. One is
9 that New Brunswick has been spraying its forest against
10 spruce budworm for almost 40 years now. It's
11 essentially had a severe spruce budworm outbreak to
12 deal with for almost four decades and it has been an
13 annual problem. They carry out a spray program
14 annually as required in the face of that spruce budworm
15 outbreak, and with those levels of protection they have
16 essentially been able to keep their balsam and spruce
17 forest alive.

18 So that's one factor that they
19 demonstrated by going back historically and looking at
20 the levels of protection they achieved. They were able
21 to conclude with a fair amount of confidence that if
22 they did get 50 or 60 per cent preservation, then in
23 fact the trees would remain alive.

24 The other very practical consideration
25 was that with the operational capability that they have

1 within the province; that is, the control technology
2 that's available in terms of pesticides, the aircraft,
3 the staff and so on, that in fact these were considered
4 to be reasonably achievable standards in an operational
5 setting, they weren't unrealistic.

6 And I think my understanding is that
7 those were the two major factors that contributed to
8 selection of those two figures. It is perhaps
9 interesting to note that there is a difference between
10 balsam and spruce and the reason for that simply was
11 that they have, like many other provinces have,
12 consistently had better success at getting protection
13 on balsam than they have on spruce. It's an easier
14 species to protect than spruce.

15 MR. MARTEL: Dr. Carrow, why - I don't
16 know if there is an answer to the question - would New
17 Brunswick year after year for that extended period of
18 time be so devastated by the spruce budworm since
19 they've have treated it for 40 years and I'm not sure
20 they are getting on top of the problem?

21 They might be holding their own, but one
22 would assume that after 40 years of treatment they
23 would win the war.

24 DEAN CARROW: Well, I think that's a long
25 story, Mr. Martel, and it requires -- perhaps requires

1 a bit of lengthy answer, but I will try to condense it
2 as much as possible.

3 They started that program in 1952 and I
4 think at the outset I would be fair to say that this
5 was a new challenge for pretty well everybody in
6 forestry. A problem of that magnitude hadn't been
7 encountered before and I think at the outset there were
8 many people who felt that if they did spray the bug for
9 a few years the problem would go away, but pretty soon
10 it was realized that what they are dealing with was an
11 epidemic that extended essentially all way from
12 Manitoba to the Atlantic Seaboard.

13 And if you look at a map of eastern
14 Canada and the north eastern U.S., New Brunswick
15 occupies a pretty small portion of that overall
16 epidemic. So as they sprayed from year to year, what
17 they would find of course is they were getting good
18 control in the areas they they had sprayed or treated,
19 but in fact they were surrounded by other jurisdictions
20 that were heavily infested.

21 The budworm moth has the capability of
22 flying 45 or 50 miles on their own to lay eggs. If she
23 gets a little help from the wind current, she can move
24 100 to 200 miles. So what routinely happens is that a
25 designated area is sprayed for protection purposes only

1 in June or late May, and in July there is a good
2 probability it will be reinfested by insects coming in
3 from areas that had not been treated.

4 So it's an annual -- you're absolutely
5 right, it's an annual problem and as I pointed out in
6 my oral evidence, Cape Breton of course made the
7 decision not to get into that game, they said we won't
8 protect because we don't want to get into an annual
9 spraying program. So there is a side-by-side
10 comparison of one jurisdiction that said: No, we won't
11 protect and they've lost ten years of wood supply, and
12 beside them is a jurisdiction that said: We will
13 protect the forest as required, and they have
14 stabilized their wood supply quite well.

15 They also have a situation, of course, in
16 which the Industry itself is very heavily dependent on
17 spruce and fir and is much more dependent on fir in New
18 Brunswick than the Ontario industry is in this
19 province.

20 MR. MARTEL: But then why doesn't Ontario
21 and Quebec who haven't treated as much, certainly not
22 Ontario to my knowledge, haven't treated as much, why
23 wouldn't they just be totally devastated?

24 Why wouldn't we just lose everything we
25 have got? The area is larger, but if we haven't

1 treated nearly as rigorously as New Brunswick, why
2 isn't there a greater toll in Ontario in terms of
3 trees?

4 DEAN CARROW: I think if you look back at
5 the volume lost data that's been generated by Forestry
6 Canada - and they have only been doing this now for
7 perhaps eight or ten years, it's a fairly recent effort
8 to try to actually quantify the amount of volume that's
9 lost - you will find that the volume lost in Ontario
10 due to spruce budworm is very, very substantial,
11 something in the order of 15 million cubic metres.

12 Now, as a comparison, that's about twice
13 the provincial harvest in the Province of New
14 Brunswick. I think New Brunswick harvests something in
15 the order of 7 million cubic metres a year, so that
16 Ontario of course is a very much larger jurisdiction
17 and there is obviously -- Ontario has been able to
18 absorb a loss in the order of 15 million cubic metres
19 without seriously affecting the industry.

20 On the other hand, that magnitude of loss
21 in New Brunswick that harvests only 7 million cubic
22 meters a year would be devastating.

23 MR. MARTEL: Yes, but it still doesn't
24 answer why after we have had the same infestation for
25 40 years, why the epidemic wouldn't be so much greater

1 in Ontario having not treated it nearly as rigorously
2 as New Brunswick has?

3 I'm not sure if you get the gist of my
4 question. One would simply assume that year after year
5 it would just get worse and worse and worse until you
6 reach a point that you are virtually wiped out and that
7 hasn't happened.

8 DEAN CARROW: Well, it certainly
9 historically has happened in Quebec and Ontario where
10 very large areas of forest have been killed in both of
11 those provinces, and essentially the province has taken
12 the position that that particular forest is not an
13 essential part of the wood supply.

14 I can think, for example, of the Black
15 Sturgeon area west of Lake Nipigon, that in the 1940s,
16 early 1950's, was totally destroyed by the the spruce
17 budworm. There are many parts of northwestern Quebec
18 boarding on Ontario where there were huge losses back
19 in the 1960s and early 70s but, again, I think it
20 was -- provincially at the time it was considered that
21 those particular forests were not absolutely critical
22 to the wood supply for the province at that time;
23 whereas in New Brunswick, as I said, it is quite a
24 different situation.

25 MR. MARTEL: All right.

1 MS. KLEER: Q. You said that the spray
2 program began in, what, 1952, in New Brunswick?

3 DEAN CARROW: A. 1952.

4 Q. When they began, did they begin using
5 chemicals or did they begin using B.t?

6 A. No, the first programs involved the
7 use of chemicals. B.t. was not available at that
8 particular time and, in fact, it wasn't until around
9 the mid 1960s that B.t. became available and then only
10 as an experimental material. So in the first years
11 they relied exclusively on chemicals.

12 Q. But is it fair to say that as between
13 chemicals and B.t., once they switched over to using
14 more B.t., that essentially they were able to obtain
15 the same level of preservation; i.e., 60 per cent for
16 balsam fir, 50 per cent for white spruce -- sorry, for
17 red and black spruce?

18 A. In the Province of New Brunswick?

19 Q. Yes.

20 A. That particular province, as I
21 understand it - and again you will have to appreciate
22 that I'm speaking from the standpoint of someone who is
23 living in Ontario now, but I have had some association
24 with New Brunswick - I think there are two
25 considerationss there.

1 They probably -- I would say they are the
2 most advanced province in Canada with respect to
3 spraying technology in terms of the use of pesticides
4 and the use of equipment and delivery systems and so
5 on. They had developed the use of chemicals to the
6 point where they could use them at very, very low
7 volumes and achieve high levels of protection.

8 They were not able to get similar results
9 with B.t., and even in the present time they maintain,
10 I think, that if they want a high probability of
11 success of protection they will rely on chemical spray
12 as opposed to B.t.

13 They have introduced B.t. into their
14 program largely because that particular province has a
15 lot of rural habitation and there was concern
16 developing throughout the rural areas about spraying,
17 and in order to accommodate that concern around areas
18 that are inhabited in the province about tending they
19 have had to redesign their program.

20 So in areas close to habitation, I should
21 say, they are using -- B.t. has the preference as the
22 preferred material. Where they are living in more
23 remote areas that are inhabited, my understanding is
24 they still prefer the use of chemicals because they
25 consider them to be more effective. Table 10 on page

1 60 of the Carter paper says that -- illustrates that.

2 MS. KLEER: I'm not sure it necessarily
3 illustrates that, perhaps I could ask you a question
4 about that.

5 There is no indication in that table as
6 to what particular areas were sprayed and whether or
7 not -- well, first of all, you would agree there is no
8 indication as to what particular areas were sprayed in
9 that table?

10 A. As to location, no, but numbers of
11 hectares, yes.

12 Q. Okay. But there is also -- would you
13 agree there is also no indication of whether or not
14 there were adverse weather conditions which might have
15 effected?

16 A. (nodding affirmatively)

17 Q. Okay. If I could just turn while we
18 are on the same page, page 9, first paragraph. Again,
19 there is a statement at the bottom that says:

20 "Nevertheless, when pre-spray populations
21 are very high or extreme, a spray program
22 might still be considered beneficial when
23 foliage protection is less than the
24 objective, though a complement
25 of vegetative buds is retained for the

1 following year "

2 So I take it, then, that if you got
3 something less than 60 per cent or 50 per cent they
4 still might consider it beneficial; is that correct?

5 A. Yes, that's right, Ms. Kleer. I
6 think that perhaps reinforces one of the messages we
7 have tried to put before the Board, and that is the
8 need for flexibility in options with respect to
9 control.

10 In some particular situations through a
11 variety of circumstances, I guess, some forest areas,
12 when they are considered for protection, are found to
13 be in an extremely poor condition, and by that I mean
14 they've suffered several successive years of
15 defoliation with the result that the trees are left
16 with very, very few needles. In fact, about the only
17 living potential for live growth on them is the
18 vegetative buds.

19 And in that particular situation, I think
20 you can appreciate that it would be important that a
21 very high level of protection be afforded to those
22 particular buds because they really are the only
23 needles that are going to appear on the tree that will
24 be functioning physiologically and contributing to the
25 growth and development of the tree.

1 In those particular situations, we found
2 in the past that B.t. generally is not very effective
3 because it's a more slow acting -- a more slowly acting
4 material. And where trees are already in a very
5 threatened condition, and you combine that with high
6 larval populations, it is important to get immediate
7 control. Once those buds open and begin to grow and
8 once the larvae begin to feed, it is important to get
9 very rapid control and that be achieved with chemical
10 much more successfully than it can with B.t.

11 Q. When you say slowly acting -- B.t.
12 being more slowly acting than chemicals, what is the
13 time frame that you're talking about?

14 A. Well, it has a dual mode of action.
15 One is, it contains a toxic protein crystal which, if
16 ingested, will cause some level of mortality fairly
17 quickly. The difficulty with spruce budworm is that a
18 reasonable proportion of the larval population either
19 doesn't eat enough of that or doesn't seem to be
20 particularly susceptible to it, with the result that
21 there is often a five to seven day delay before the
22 bacterial spore itself germinates within the insect and
23 causes the disease which leads to its death.

24 So there is -- quite often what we've
25 observed in the spruce budworm is that there is a

1 delayed effect which can take in the order of five to
2 seven days before the insect dies as a result of that
3 spraying.

4 Q. But would not the ingestion of the
5 substance of B.t., of the actual crystal that causes
6 death eventually, does that not decrease the ability of
7 the spruce budworm to eat in that five to seven day
8 period?

9 A. As a general rule, that's correct.
10 If it consumes enough of that protein -- if it consumes
11 enough, of course, it dies outright. If it consumes a
12 sub-lethal dose, our understanding is that that
13 inhibits feeding to some degree but, as I said earlier,
14 what seems to happen is that some of those larvae at
15 least don't seem to get enough of it to interfere with
16 their feeding, particularly when you have high larval
17 densities on a particular tree.

18 If you have in the order of 30 or 40
19 larvae on a 45-centimetre branch, it's understandable
20 that a number of them would survive that.

21 Q. But isn't it also true that if you
22 spray with chemicals and you have a high density of
23 larvae per bud -- sorry, per area, that you have that
24 same problem; i.e., you just don't spray them all?

25 A. No, you don't, but the opportunity

1 for contacting the insecticide is there through
2 different modes of entry. It can contact the
3 insecticide by walking over it on the stem or on the
4 twig, so it's a form of contact.

5 Of course the insecticide can alight
6 directly on the body of the insect when it's sprayed
7 and it can kill it that way, or the third route of
8 entry of course is ingestion if it happens to eat some;
9 whereas B.t. must be ingested to be effective, it can't
10 work through the skin.

11 Q. Are you aware of any evidence which
12 would compare in a dense population settings what the
13 actual effectiveness, in terms of achieving protection
14 of the vegetative buds, would be as between B.t. and
15 chemicals?

16 Now you are giving me a mode of action
17 explanation, but has there ever been any testing of
18 that to see in fact what the difference is between B.t.
19 and chemicals at a high level of infestation?

20 A. Do you mean experiments designed to--

21 Q. To test, yes.

22 A. --demonstrate that particular effect?

23 Yes, I believe there have been, although at this point
24 I would have difficulty giving you a specific
25 reference, but certainly my recollection is that there

1 has been work done to -- largely in the context of
2 trying to improve the efficacy of B.t., to try to find
3 out what its limitations are and try to improve its
4 field performance.

5 And there has been a suggestion for a
6 number of years that once budworm larval densities get
7 above a certain point, the efficacy of B.t. is
8 questionable and the managers, of course, have been
9 trying to define what that threshold is so the material
10 can be used in situations where the probability of
11 success is relatively high.

12 Q. Well, then, I don't understand this
13 comment that's made in this paper which says that when
14 you have high pre-spray populations, and it doesn't
15 make any distinction between B.t. treatment versus
16 chemical treatment, that you could still expect to get
17 a lower level of foliage protection and your goal
18 becomes maintaining a complement of vegetative buds.
19 They don't make any distinction here between chemical
20 and B.t. and the effectiveness in achieving that
21 protection of complement of vegetative buds.

22 So am I fair to summarize at this point
23 and say that in your opinion, based upon the mode of
24 action, you would expect B.t. to be less effective in
25 obtaining that complement -- sorry, retaining that

1 complement of vegetative buds as compared to chemicals?

2 A. I would expect that myself, based on
3 my own experience particularly, where you have a
4 situation with high population densities.

5 Q. Okay. But you are not familiar at
6 this point with any studies that would confirm that
7 result, your expected result?

8 A. I can't give you a specific reference
9 right now, Ms. Kleer.

10 Q. Would it be possible for you in a
11 limited amount of time to find that reference or
12 references?

13 A. What do you mean by a limited amount
14 of time? I guess...

15 Q. Well, I could have it as a written
16 answer to an undertaking if it would take -- all I'm
17 asking you, would it be too much trouble to do that or
18 would it be something easily accessible to you?

19 A. No, I'd be willing to provide that
20 provided I could have some time to collect that
21 information.

22 MS. KLEER: Is that...

23 MS. CRONK: That's fine.

24 MS. KLEER: Okay. If you could do that,
25 I would appreciate that.

1 Q. So is it fair to say, though, that
2 whether using chemicals or B.t. in a year of high
3 infestation you might not be expected -- or in New
4 Brunswick, they don't expect to obtain their 60 per
5 cent and 50 per cent levels of preservation because of
6 the level of high infestation; am I correct in assuming
7 that?

8 DEAN CARROW: A. I'm sorry, would you
9 mind repeating that?

10 Q. Okay. In a year when there is a high
11 level of infestation, does New Brunswick expect to
12 obtain 60 per cent and 50 per cent levels of
13 preservation, or does their goal become retaining a
14 complement of vegetative buds?

15 A. No, the two are not necessarily
16 mutually exclusive, Ms. Kleer, because the vegetative
17 bud of course opens and develops into the current
18 year's growth, so that the measurement would be made on
19 the foliage that developed from that vegetative bud
20 during that particular year.

21 Q. Well, then, if I could go back to
22 page 9. If I read that statement again in the first
23 paragraph, it says:

24 "Nevertheless, when pre-sprayed
25 populations are very high or extreme,

1 a spray program might still be considered
2 beneficial when foliage protection is
3 less than the objective, though
4 a complement of vegetative buds is
5 retained."

6 So they seem to be suggesting there, do
7 they not, that they won't necessarily achieve their
8 preservation?

9 A. They may not, yes, that's right. I
10 guess the options in those cases are you either spray
11 those particular trees or stands in an attempt to keep
12 them alive, or essentially you don't protect them and
13 that pretty well guarantees that they won't live. So
14 it's a fairly limited set of options.

15 Q. Now, is it fair to say that these
16 standards that were set up in New Brunswick, and I
17 would also add Quebec at this point, are not designed
18 to achieve an acceptable level of incremental growth,
19 that that's not how they were set?

20 A. That's fair to say, that's right.

21 Q. So, in effect, you don't know of any
22 standards that are geared to achieve that goal, i.e.,
23 achieving a certain level of increase in wood volume?

24 A. No, the standards that have been
25 adopted by both New Brunswick and Quebec are designed

1 primarily to keep the trees alive.

2 Q. Okay. Can I turn now to
3 interrogatory No. 9 of the Ministry of Natural
4 Resources for Panel 7.

5 I don't believe that has been introduced
6 as part of 1136, so we will introduce it now.

7 MADAM CHAIR: That will be Exhibit 1204,
8 and that's Ministry of Natural Resources' question 9
9 for OFIA/OLMA Panel 7.

10 ---EXHIBIT NO. 1204: MNR Interrogatory Question No.
11 9 and answer thereto re OFIA/OLMA
Panel 7.

12 MS. KLEER: Q. Dean Carrow, I take it
13 you prepared this answer based on your former answers?

14 DEAN CARROW: A. Yes, that's right.

15 Q. Now, have you actually looked at the
16 data to determine whether or not these preservation
17 standards have been occurring consistently for over 40
18 years?

19 A. In New Brunswick?

20 Q. Yes.

21 A. No, I haven't.

22 Q. So when you say this standard is used
23 by New Brunswick which has succeeded for almost 40
24 years in maintaining its softwood forest in a healthy
25 state, that answer is not based on looking at data,

1 it's based upon -- what is it based upon?

2 A. No, it's -- in fact gramatically, Ms.
3 Kleer, perhaps it would be clearer to break that into
4 two sentences.

5 "This standard is used by New Brunswick.
6 New Brunswick has succeeded for almost 40
7 years in maintaining its softwood forest
8 in a healthy state."

9 I don't mean to suggest that they have
10 used that standard deliberately for 40 years because,
11 as I said earlier in my response, that is something
12 that they have shown that they could achieve
13 operationally. And at the point in time which these
14 standards were adopted, the judgment was that based on
15 nearly 40 years of history that, in fact, those levels
16 of preservation had succeeded, were generally
17 achievable and in fact the forest was alive in the
18 areas that had been sprayed.

19 Q. Again, though, to say that they were
20 generally achievable and the forest was alive doesn't
21 necessarily mean, does it, that if they had achieved a
22 lower level of protection that the forest might still
23 not be alive?

24 A. I would agree with that. I think
25 there is no way of determining that retrospectively, if

1 you wish.

2 Q. Is it fair to say that for neither
3 Quebec or for New Brunswick that they have taken these
4 standards and tested them scientifically to see that
5 that level is the minimum level required to achieve a
6 growing and healthy forest?

7 In other words, what I am getting how is,
8 how have these standards -- or have these standards
9 been validated or are they simply an observation of
10 what can be achieved?

11 A. As I pointed out in my own evidence,
12 Ms. Kleer, the selection of those numbers, in my view,
13 are rather arbitrary and I might point out that they
14 are fairly recent developments.

15 I think both of those standards in Quebec
16 and New Brunswick were adopted in the 1980s, so they
17 are not something that has been in place for a long
18 time and, in fact, prior to the adoption of numerical
19 standards, the way in which New Brunswick and perhaps
20 Quebec as well, although I will restrict my comments to
21 New Brunswick, the way in which they assess the
22 effectiveness was to aerially survey the sprayed area
23 and determine what percentage of that area that had
24 been sprayed was still green and what percentage had
25 been moderately to severely defoliated.

1 So that these particular standards
2 adapted both in Quebec and New Brunswick are a first
3 attempt to adopt numerical standards. In our evidence
4 we point out the need to carry out research to develop
5 the scientifically validated quantitative standard for
6 the Province of Ontario and to apply those standards in
7 the assessment of annual spraying programs.

8 Q. If you were to design these standards
9 for Ontario, what would be the linkage that you would
10 want to obtain? Would it be between foliage protection
11 levels or would it be focusing on the annual
12 incremental level of growth -- sorry, of volume
13 increase?

14 A. I guess there are obviously two
15 objectives in spray programs which should kept in mind
16 here, and perhaps one would have to be clear as to what
17 we are trying to achieve or what we are giving the
18 priority to.

19 One, and in my view the most important
20 objective, is to in fact keep mature and overmature
21 commercial forest that consist -- consisting primarily
22 of spruce and fir species, to keep these trees alive so
23 that in fact they will be available for harvesting over
24 time. Those trees are in a condition where they are
25 not putting on very much annual increment or volume

1 growth anyway; they are reasonably stable or static.

2 They are, because of their
3 physiologically condition, susceptible to disease,
4 particularly in an insect attack and it becomes even
5 more important to keep them in reasonably good health
6 just so they will stay alive. So you are not counting
7 protecting annual increment or growth, in fact what you
8 are trying to do is simply keep those trees in a live
9 position.

10 The second objective, and certainly a
11 very important one, is one that applies to younger
12 growing stands, the regenerating forest, both in terms
13 of natural regeneration and plantations which are under
14 attack by the spruce budworm and which we know now can
15 lose very substantial amounts of annual volume growth
16 due to defoliation by spruce budworm.

17 That is a field which is not well
18 understood at all and, as we've pointed out in our
19 evidence and I think I would be in a position to say,
20 we really have no very credible idea of how much
21 foliage you would have to preserve in order to ensure
22 that you get a prescribed amount of volume growth per
23 year, but I would say that it is extremely important
24 because it is going to affect the time in the future at
25 which those particular stands become available for

1 commercial harvest.

2 Q. So would it be fair to say that
3 neither the Quebec standards or the New Brunswick
4 standards are scientifically validated standards meant
5 to achieve a certain goal; i.e., whether it be foliage
6 protection or maintaining a mature forest in a
7 harvestable state?

8 A. They have not been developed through
9 a set of designed experiments, if that's what you mean.
10 As I understand it, that's not the situation.

11 Q. When you prepared Table 14, was there
12 any particular reason why you chose the New Brunswick
13 standard for 60 per cent and 50 per cent as opposed to
14 the Quebec standard?

15 A. No, there wasn't, Ms. Kleer. I just
16 wanted to choose one of the two standards just -- and,
17 again, just to illustrate the value of having a
18 standard whereby you could compare the relative success
19 or failure of their annual protection programs.

20 Q. Just one final question on these
21 standards. Would you suspect that in developing those
22 standards you would have different standards for the
23 Great Lakes forest versus the boreal forest, and I am
24 talking now if you were talking about a standard to
25 protect plantations and naturally regenerating areas?

1 A. Could you be more specific? Could
2 you help me here? Do you mean a standard to keep the
3 trees alive or preserve volume growth or...

4 Q. Well, to -- I'm not certain what kind
5 of standard you would envision for plantations and new
6 growth. I don't know if you are talking now about a
7 foliage protection standard or annual incremental
8 volume increase.

9 From what you've just said I thought you
10 were -- you would posit that you should have a foliage
11 protection standard developed for Ontario's
12 plantations? Is that what you would envisage?

13 A. Yes, I think if I could just
14 elaborate a little bit, and I hope this is helpful.

15 This is a hypothetical, Madam Chair,
16 entirely, I hope you appreciate that.

17 I could envisage a situation in which
18 there may well be a different quantitative standard for
19 mature commercial fir and spruce that are perhaps
20 involved in the 20-year management plan and our
21 schedule for harvesting some time within a 20-year time
22 frame. That may be one numerical standard and it may
23 be different for spruce and fir, I don't know that.

24 In fact, there may be a different
25 numerical standard that develops through time for

1 plantations and managed natural forests, again for
2 spruce and fir. I would say that's quite a ways into
3 the future. That's a level of sophistication that I
4 think we are a long ways away from, but certainly if we
5 were to try to set an objective i the future with
6 respect to research that's something we would have to
7 consider.

8 Q. Okay. Well, then, I will just repeat
9 my question then. Comparing boreal versus Great Lakes
10 forest, would you expect to use a different standard
11 for plantations or develop a different standard for
12 boreal plantations versus Great Lakes plantations?

13 A. I, quite frankly, wouldn't identify
14 that as a priority. It is, again, another level of
15 sophistication that I think may become desirable some
16 time in the future, but I don't see that as being a
17 near term priority or a near future priority.

18 Q. Okay. Let's look more closely now at
19 Table 14. I will be introducing an exhibit at this
20 time. Do you have a copy of this?

21 A. Yes, I have.

22 MS. KLEER: . (handed)

23 MADAM CHAIR: Exhibit 1205, and what is
24 this, Ms. Kleer?

25 MS. KLEER: Well, I will get into that.

1 MADAM CHAIR: Okay.

2 MS. KLEER: Q. Dean Carrow, can you
3 confirm that this material that I have provided to you
4 is an accurate summary of the data contained in the
5 same papers from which you prepared your summary table,
6 Table 14. You've had a chance to review this, I take
7 it?

8 DEAN CARROW: A. Yes, I have, Ms. Kleer.
9 Now, when you say this data, are you referring
10 specifically to the tabular data for 1981, '82, '83 and
11 '84?

12 Q. Yes, for all those four years.

13 A. I've reviewed the data that you've
14 presented on those pages and I think the only
15 difficulty I have is with the summaries at the bottom
16 of those pages. Your calculations and mine don't line
17 up entirely, so there is some difference, I guess, as
18 to how those calculation were derived. I'm not sure.

19 What I am particularly concerned about is
20 the use of the 30 per cent foliage protection standard
21 in those tables and in going back and recalculating
22 that data because in Table 14, as I pointed out, I had
23 used the New Brunswick standard, but I went back and
24 recalculated that data using the Quebec arithmetic
25 calculation and I do get differences in terms of

1 success rates.

2 I'm not sure that there are very
3 significant differences when you look at the
4 percentages; in other words, they may well come out to
5 be very similar in terms of percentage, but the number
6 of plots, for example, that were -- that successfully
7 achieved that 30 per cent standard does differ.

8 Q. All right.

9 MR. KLEER: Perhaps for clarification of
10 the Board I will explain what this is and ask Dean
11 Carrow to confirm that this table is in fact what it
12 is. I just want to explain how the tables work.

13 In each of the columns there is a per
14 cent defoliation listed for each assessment plot. So
15 if you look then at 1981, per cent defoliation, Table 4
16 just refers to the particular table out of which the
17 data was taken, and that was mostly put in for Dean
18 Carrow's understanding of what I was pulling out of the
19 information. So that for balsam fir, 2 per cent
20 defoliation was achieved for one of the plots using
21 B.t.k. and 7 per cent on white spruce was achieved
22 using B.t.k.

23 Is that a fair summary of what the nature
24 of this information is?

25 DEAN CARROW: A. Yes, that's correct.

1 MS. KLEER: Does my friend have any
2 objection to introducing this as an exhibit?

3 MS. CRONK: None.

4 MS. KLEER: I would suggest we call it
5 defoliation --

6 MS. CRONK: Subject to proof, of course,
7 Madam Chair.

8 MS. KLEER: Yes.

9 Q. Now, just looking for the moment at
10 Table 14, and I will get back to this at a later
11 point --

12 MADAM CHAIR: Excuse me, Ms. Kleer, did
13 you want to call that the summary of data used in Table
14 14 of Exhibit 1131?

15 MS. KLEER: I'd call it elaboration or --

16 MS. CRONK: Sorry, Madam Chair, if I
17 could just interject. I think it should be Table 14, a
18 revised Table 14 subject to proof because it hasn't
19 been at all established that Dean Carrow agrees it
20 accurately deals with the information or, in fact, that
21 it didn't.

22 MS. KLEER: Well, he didn't say that, he
23 did say that the summaries at the bottom might be worth
24 looking at.

25 ---EXHIBIT NO. 1205: Revised copy of Table 14

1 (subject to proof).

2 MS. KLEER: Q. Now, just turning for the
3 moment to your Table 14 in your evidence. I take it
4 this a synthesis of the data that's found in the annual
5 reports of the forest pest control forum; is that
6 correct.

7 DEAN CARROW: A. Yes, that's correct.

8 Q. So there is no actual table in any of
9 those annual reports that parallels your Table 14?

10 A. No. No, there isn't.

11 Q. Now, is it true that all of the
12 papers in the annual reports from which you prepared
13 Table 14 are prefaced by a caveat which specifies that
14 the reports contain only tentative results, not
15 sufficiently complete to justify general release.

16 Do you have those reports in front of
17 you?

18 A. Yes, I do.

19 Q. Perhaps you could look at the first
20 page.

21 MADAM CHAIR: Are we back in the Carter
22 study?

23 MS. KLEER: No.

24 MADAM CHAIR: What are we looking at now?

25 MS. KLEER: This is something separate.

1 If you would -- I am going to be introducing this at a
2 later point, and perhaps it would be more helpful to
3 introduce it now so that everyone can have it in front
4 of them.

5 MADAM CHAIR: Thank you.

6 MS. KLEER: (handed)

7 MADAM CHAIR: That will be Exhibit 1206
8 and it contains four...

9 MS. KLEER: These are reports of the
10 Annual Pest Control Forum for the years 1981 to 1984
11 and if you turn to the third page of 1981, they are
12 specifically for Ontario.

13 ---EXHIBIT NO. 1206: Four reports of the Annual Pest
14 Control Forum for the years 1981
to 1984 (A-D).

15 MS. KLEER: Q. Then if we look at 1981,
16 the first set, and you turn to the second page of that
17 report, at the bottom there is a statement "For
18 Official Use Only" and that's what I was taking my
19 comment from.

20 DEAN CARROW: A. Yes.

21 Q. So you agree, then, that each of
22 those reports comes with that caveat?

23 A. Well, this is a statement that's been
24 included by the Canadian Forestry Service by Forestry
25 Canada. Environment Canada in this particular case.

1 Q. Does that statement affect the
2 confidence that you would place in your results that
3 you have summarized in Table 14?

4 A. No, it doesn't, Ms. Kleer, because I
5 am familiar with this forum, this particular forum,
6 since the early 1970s. It's an annual forum and it's a
7 forum at which all of the provinces across Canada
8 present the results of their forest insect control
9 operations, and they have been reported annually in
10 the -- in the form of the proceedings of the Annual
11 Forest Pest Control Forum.

12 In fact, to the best of my knowledge, it
13 is the only published material available on the results
14 of operational spray programs across Canada dealing
15 with forest insects.

16 Q. Then what does the comment mean that
17 these are only tentative results?

18 A. I did not write this, so I can't
19 comment on it, quite frankly. From my own experience
20 with the forum and with the Province of Ontario and New
21 Brunswick, I would infer from that that any province or
22 any jurisdiction reporting results here retains the
23 right to refine and to update those result as more
24 analysis becomes available.

25 What's happened here is that this

1 conference -- this one dated December 1st to 3rd, but
2 that conference is normally held in mid November and
3 that particular timing usually puts quite a bit of
4 pressure on staff to collect all the field data,
5 analyse it, get it summarized properly and into report
6 form in time for the forum. And, in fact, in some
7 situations I believe some jurisdictions feel that the
8 analysis is not entirely complete. In fact, some of
9 the results may change to some degree.

10 Having said that, to the best of my
11 knowledge, this remains as the only publication of
12 spraying results that exist on an annual basis.

13 Q. I'm not questioning that, all I'm
14 asking is whether or not - and I believe you've stated
15 this - that these results could change, could be more
16 refined because of the very problem you've pointed out,
17 they've got a limited time until they get to
18 publication so there may not have been accurate
19 reporting?

20 A. That's correct. If I could just use
21 as an illustration, Ms. Kleer, the report that you
22 cited by Carter, for example, which is Protection
23 Spraying of Spruce Budworm in New Brunswick is an
24 official departmental report and that is for
25 publication.

1 If you look at the results of that 1988
2 program and compare them with the results that had been
3 presented at the forum, there might be some very small
4 differences, there may be no differences, but that
5 constitutes the final set of results right there;
6 whereas the report to the forum is the report that is
7 made at that particular point in time and the province
8 or jurisdiction retains the right, I guess, to alter
9 them somewhat as required for their final report.

10 MADAM CHAIR: Do we have the final report
11 as an exhibit, Dean Carrow?

12 MS. KLEER: The final reports --

13 DEAN CARROW: I believe --

14 MADAM CHAIR: An example, the final
15 report, that being New Brunswick Annual Report?

16 MS. KLEER: The Carter paper has already
17 been referred to, it's part of an exhibit, Exhibit
18 1136.

19 MADAM CHAIR: Yes.

20 MS. KLEER: Q. Correct me if I'm wrong,
21 but I don't think we have any annual reports finalized
22 for Ontario; is that true?

23 DEAN CARROW: A. I'm not aware of any.
24 You mean submitted as an exhibit?

25 Q. Yes.

1 A. I can't answer that.

2 MADAM CHAIR: No, my question -- I'm
3 confused here. We're looking at the documents that you
4 gave us which are the Forest Pest Control forum
5 documents and Dean Carrow has said these are -- yes, he
6 acknowledges them, but he said sometimes the data is
7 reviewed further or corrected in the green cover report
8 that he just showed us, which is an annual report from
9 New Brunswick on the spray program.

10 DEAN CARROW: Yes, New Brunswick issues
11 an annual report from the provincial government on
12 their spray program.

13 MADAM CHAIR: My question was: Do we
14 have that as an exhibit somewhere?

15 MS. KLEER: Oh, this Carter report is an
16 exhibit.

17 MADAM CHAIR: And that is the Carter
18 report?

19 MS. KLEER: Yes, yes.

20 MADAM CHAIR: It's all clear now.

21 MR. MARTEL: Can I ask one further
22 question?

23 MS. KLEER: Sorry.

24 MR. MARTEL: Does Ontario put out an
25 annual report; in other words, is there a document

1 where we could double check the figures here with what
2 Ontario is releasing as its final figures? Do we have
3 such a report; does it exist?

4 DEAN CARROW: I'm not aware of those
5 reports being published at the present time, Mr.
6 Martel. I really can't answer that conclusively.

7 MS. CRONK: I can be of some assistance,
8 Mr. Martel. You recall that, and my friend Mr. Freidin
9 can comment if he considers it appropriate, filed
10 before you are what we term efficacy data that was
11 provided by the Ministry of Natural Resources in
12 response to an interrogatory that we delivered on Panel
13 13, and encompassed in that stack of documents that
14 went in as an exhibit - and I'll find the exhibit
15 number for you if you wish --

16 MR. CHURCHER: 659.

17 MS. CRONK: 659, Mr. Churcher indicates -
18 are the efficacy reports available from Ontario and I
19 assume, as is usually the case, that the MNR provided
20 us with that kind of information and that is what you
21 have.

22 MADAM CHAIR: Thank you, Ms. Cronk.

23 MS. KLEER: Q. Dean Carrow, is it true
24 that the chemical applications prior to 1985 which
25 you've summarized in Table 14 are not limited to

1 fenetrothion, aminocarb and carbaryl but also included
2 other applications of Orthene?

3 DEAN CARROW: A. From 1979 to '84?

4 Q. Yes. If it's of any assistance to
5 you --

6 A. If you could refer me to a specific
7 report, Ms. Kleer, I could help.

8 Q. All right. If we could look at the
9 1981 report, Table 16 which is page 189 at the bottom.

10 MS. CRONK: I'm sorry what page?

11 MS. PALOWSKI: 189.

12 MS. KLEER: Sorry. We may have the wrong
13 report. Let me just check that.

14 MADAM CHAIR: Is this a copy of the
15 Terrace Bay District?

16 MS. KLEER: Yes. At the bottom, Terrace
17 Bay District, Orthene appears there.

18 DEAN CARROW: Mm-hmm.

19 MS. KLEER: Q. So then is it fair to say
20 that your Table 14 summarized data that included
21 applications of Orthene, at least certainly this one?

22 DEAN CARROW: A. It didn't include Table
23 16, Ms. Kleer, and the reason for that is because that
24 particular table refers to applications that were put
25 on by ground-based equipment and I thought that for the

1 purposes of this particular discussion, which was
2 focused very heavily on aerial application of
3 pesticides, that it might be misleading to include
4 results with ground-based equipment.

5 They're fairly infrequent operations and
6 it involves an entirely different technology and
7 application rates and so on. So that Table 16 is not
8 included in the summary I prepared.

9 Q. All right. Then that would be true
10 of all the mist floor applications?

11 A. That's right.

12 Q. Therefore, the summary that I
13 provided to you earlier may have been different from
14 the results you have in Table 14 because you didn't
15 include mist floor results?

16 A. Yes. Yes, that's right, in terms of
17 the number of the plots, number of plots included.

18 Q. If we can look at the 1982 report and
19 Table 6 which is page 332 at the bottom.

20 MADAM CHAIR: Ms. Kleer, I think we
21 should alphabetize these so we will have 1206A, B, C
22 and D in the exhibit, A being 1981, B is 1982, C is
23 1983 and D is 1984.

24 MS. KLEER: Thank you, that would help.
25 Thank you.

1 Q. All right. Then looking at Exhibit
2 1206B, Table 6, would you have summarized the data in
3 your Table 14 for Orthene applications for Friday Lake
4 SPAC protection area; is that correct?

5 DEAN CARROW: A. Yes, I have included
6 that, that's right.

7 Q. All right. So there's one example
8 also. The other Table 7, which includes applications
9 of Orthene followed by Matacil--

10 A. Yes.

11 Q. --would you also have included that?

12 A. Yes, that's right.

13 Q. All right. If we can go back -- I'm
14 sorry for this jumping around. In 1981 data which you
15 summarized in Table 14 you had nine plots for spruce
16 which were treated with chemicals and out of these nine
17 a hundred per cent-- sorry, out of those nine all nine
18 achieved the foliage protection levels.

19 Now, when I went through your 1981 data I
20 only found nine pieces of data which included Table 16
21 and Table 17. Perhaps you could clarify for white
22 spruce treated with chemical where you obtained your
23 nine plots, this is for the year 1981?

24 Would you have that -- could you do that
25 now, or could we do that over lunch? Would it take --

1 A. Maybe I'd better do that over lunch,
2 Ms. Kleer, and could you make clear specifically what
3 you want.

4 Q. All right. For the year 1981, could
5 you indicate which tables you summarized to get your
6 nine plots out of which nine achieved the protection
7 standard, and this is just for chemicals.

8 A. For chemicals on spruce?

9 Q. On white spruce, yes.

10 A. Okay. I can give you that right now.

11 Q. Can you? All right.

12 A. Tables 6, 8 and 12.

13 Q. Oh, I see. So then for Table 12 --

14 MADAM CHAIR: Is that Exhibit 1131, Dean
15 Carrow?

16 MS. KLEER: That's exhibit 1206A.

17 MADAM CHAIR: All right.

18 MS. KLEER: Okay. Thank you for that
19 clarification.

20 Q. All right then, I will go back to my
21 former line of questions here.

22 So, therefore, it's fair to say that in
23 your Table 14 you included results for Orthene, so it
24 was chemicals, not just those limited to the chemicals
25 which are now registered for use in the area of the

1 undertaking?

2 A. Orthene is still registered for use.

3 Q. But, it isn't -- oh I see, okay. But
4 it is no longer -- it's only registered for use --

5 A. It's still registered for use in
6 Canada and it's still approved for use by the Ministry
7 of the Environment in Ontario, as I understand it.

8 Q. All right.

9 MADAM CHAIR: Is there another chemical
10 name for Orthene, Dean Carrow?

11 DEAN CARROW: The common name is
12 A-c-e-p-h-a-t-e.

13 MS. KLEER: Q. Now, in Table 14 you
14 refer to the plots as being assessment plots. What
15 exactly does that term mean, if you can clarify that?

16 DEAN CARROW: A. Assessment plots are
17 the ground-based plots which the Province of Ontario
18 uses for measurement of defoliation and population
19 reduction of insects.

20 In other words, it's a sampling technique
21 essentially and it's a sample plot in which a
22 designated number of trees are sampled for defoliation
23 on spruce and fir and also population reduction. And
24 those are the plots which are then reported in the
25 proceedings of the Forest Pest Control Forum.

1 Q. Now, there also appear -- if we can
2 look at Exhibit 1206A, in any of the tables there is
3 reference to check plots in addition to what you have
4 called assessment plots.

5 If you look, for example, at Table 16,
6 page 189 under Cochrane District thuricide 16B, there's
7 a per cent defoliation of Greenwater Provincial Park
8 and then you also have data for the check.

9 Now, that check is not what you referred
10 to or reported in your Table 14; is that correct?

11 A. No. The check plot, Ms. Kleer, is
12 the untreated control plot which is used for
13 comparison.

14 Q. Where is that located, the check
15 plot?

16 A. I really can't tell you. I don't
17 know because I wasn't involved in that particular
18 assessment.

19 Q. So you wouldn't have any -- would you
20 have any familiarity with any of the check plots that
21 are reported in these annual reports? What I'm really
22 getting at is: Geographically, are they located in the
23 same or adjacent area?

24 A. Yes, they are, and they are located
25 in such a way as to simulate the conditions in the

1 treated areas as closely as possible.

2 Q. All right, thank you. Is it true
3 that the application rates differ between the
4 assessment plots which you have summarized in Table 14;
5 they are not consistent with the same application rates
6 for either chemicals or B.t.?

7 A. That's correct. Yes, they include a
8 range of application rates.

9 Q. So that would include both ranges of
10 numbers of application -- sorry, not ranges of, there
11 are also included double applications versus single
12 applications?

13 A. That's correct as well, as I
14 understand.

15 Q. And there would also be differences
16 between the actual numbers of BIUs which are -- I
17 always forget what those are, sorry.

18 A. A billion international units.

19 Q. Okay. As between the plots then?

20 A. That's correct.

21 Q. Now, the fact that you have different
22 rates, sometimes double applications, would that not
23 make it difficult from a statistical perspective to
24 make a straight comparison between plots, between
25 assessment plots as to effectiveness?

1 A. Yes, and I don't think that Table 14
2 suggests that we are trying to do that at all, Ms.
3 Kleer. I hope it hasn't created the impression that we
4 are trying to do a year-by-year comparison of
5 effectiveness between plots because that certainly
6 wasn't the intent.

7 Q. But it is true that you've used Table
8 14 to compare B.t and chemicals in terms of their
9 effectiveness; isn't that true?

10 A. I don't believe that is stated in our
11 evidence at all. I think the intent of Table 14, if we
12 can refer to the text, is really two-fold: One, is to
13 show that, first of all, that if a numerical standard
14 is chosen then it allows the jurisdiction to assess the
15 annual spray program in terms of per cent success or
16 failure, that's one thing; secondly, it allows a
17 general assessment of the relative rate of success of
18 operational spraying programs generically, prior to
19 1985 when the Minister of Natural Resources prohibited
20 the use of chemicals and following 1985 when the
21 program has relied exclusively on B.t.

22 So that what we have here is a situation
23 in which there are six years of operational results
24 from 1979 to 1984 in which the resource manager had at
25 his or her disposal both B.t. and chemical insecticides

1 as technology; in other words, the flexibility was
2 there to choose the option which was best suited to the
3 conditions. Following 1985 that flexibility was lost
4 because only B.t.k. was available regardless of what
5 the condition was.

6 And in presenting my direct evidence I
7 think -- my oral evidence, I should say, I made that
8 quite clear that, in fact if one looked at balsam fir
9 post-1985 and pre-1985 there is relatively good
10 consistency of results through all of those 11 years
11 and to me that suggests that, first of all, that B.t.
12 is generally effective for protecting balsam fir and,
13 in fact, approximately 67 to 70 per cent of the plots
14 in both those time periods met the standard.

15 If you move over to the spruce column we
16 have a different situation. Prior to 1985, 84 per cent
17 of those assessment plots met that assessment -- met
18 that standard that we used in that particular table;
19 whereas after 1985 when chemicals were not available
20 that rate dropped to 55 per cent. So there was about a
21 30 per cent reduction in the relative level of success.

22 And what I'm suggesting to you is that
23 one of the major contributing factors to that drop in
24 success is the loss of a technology which was suited to
25 particular situations for spruce and for population

1 densities and so on.

2 Q. All right. I'll get back to point
3 later. Now, if you look at the data, generally
4 speaking, is it true that in some cases the check plots
5 had percentages of defoliation which, without any
6 spraying, already achieved the 60 per cent preservation
7 level for balsam fir?

8 A. Sorry, what table are we referring to
9 now or what year?

10 Q. Well, I'm speaking generally but I
11 will give you a specific reference. 1982, 1206B --
12 Exhibit 1206B, if you look at Table 8 plantation No. 43
13 in Rogers Township for Matacil, if you look at the
14 bottom one, Rogers Township plantation No. 43,
15 percentage defoliation -- sorry, that may not be the
16 correct example.

17 Pardon me, I've incorrectly referred to
18 that. If I can have a moment I did have an example and
19 I did lose it. Perhaps I can get back to this after
20 the break and I will find an example.

21 Now, is it true that if you have very low
22 pre-spray populations of budworm that you can't
23 practically assess your success in achieving the
24 protection standard or the preservation standard; is
25 that a fair comment?

1 In other words, if any of these plots
2 already had a very low pre-spray population but they
3 sprayed them anyways, would it be fair then to assess
4 your success in achieving the protection standard for
5 that particular plot?

6 A. I think that obviously, Ms. Kleer,
7 makes that particular assessment of questionable value
8 and I would say that in going through the plot-by-plot
9 results of the four years that you have given me to
10 review, it's obvious - and in fact constructing Table
11 14 - it was obvious that there were situations in which
12 the pre-spray budworm population densities were so low
13 that the foliage protection achieved through that was
14 really nil or perhaps there wasn't any foliage
15 protection achieved at all.

16 So in including those results it really
17 is a questionable value in demonstrating the
18 effectiveness or lack of effectiveness of a particular
19 product or a particular project, but in fact if one
20 wanted to -- I guess you could go through the results
21 and deliberately make selections as to what a threshold
22 level of budworm population would be below which you
23 would not include the results.

24 Q. But that's not what you did in your
25 Table 14?

1 A. No, I didn't, I included all of them
2 because that's rather a subjective decision.

3 Q. All right, I agree with that. If you
4 jump ahead though -- or jump back actually to the
5 question that you were saying earlier, if you've
6 compared white spruce effectiveness post-1985 when only
7 B.t. was used to levels prior to -- sorry, not
8 levels -- to prior to 1985, and you've used this data
9 to do so and yet you have included the assessment plots
10 where you already had very low pre-spray populations,
11 is it fair then to make your comment that you've made
12 that this data indicates that B.t. is less effective on
13 white spruce than are chemicals or if you have
14 available to you the option of both chemicals and B.t.?

15 A. There are always situations -- or
16 generally situations, Ms. Kleer, in which you're
17 dealing with assessment plots in which there are low
18 budworm population densities. It's not restricted to
19 prior to 1985, I guess that's my point, it's an annual
20 event which generally occurs as matter of course in
21 field situations and in fact may, through a variety of
22 circumstances, be included in the spray operation.

23 It's a comment really on the precision
24 and the sophistication of design of spray programs, if
25 you were to exclude every assessment plot which, for

1 example, had a low pre-spray budworm population level,
2 it would be a major challenge for any manager to try to
3 define what area that particular assessment plot
4 applied to with respect to protection; after all, it
5 may only involve 20 or 30 trees and you would have to
6 make a decision then as to whether that low population
7 condition applied over one hectare or whether it
8 applied over a hundred or a thousand hectares.

9 So those are anomalies in the operational
10 setting that really gets very, very difficult to avoid.

11 Q. I'll go back to my question. If
12 you've used this data as the basis of concluding that
13 post-1985 you were simply not able to achieve the same
14 levels of control on white spruce as prior to 1985 when
15 you had both options available to you, it seems to me
16 that you are making a jump based upon data that has a
17 hole in it because of the number of plots that have low
18 pre-spray populations which you've included in your
19 analysis.

20 A. What I was trying to point out was
21 that the problems that you have identified are not
22 restricted to prior to 1985.

23 Q. Okay.

24 A. They are an annual event more or
25 less. There is no reason to suggest that you only have

1 low budworm population densities at a time when you
2 have chemicals available and that as soon as chemicals
3 are banned you don't have those population densities,
4 in that it's a natural biological event, that you're
5 dealing with variable population densities in the
6 field.

7 Q. Perhaps you can help clarify. Is it
8 true that in 1985 there were higher levels of
9 infestation than in prior years; would you be able to
10 answer that question without looking at the data?

11 A. No, I can't, I'd have to.

12 Q. All right. If we go back to the
13 point of having low pre-spray populations included in
14 your analysis of Table 14, is it really fair to say
15 that you would have achieved -- let me rephrase the
16 question.

17 You have reported in Table 14; have you
18 not, that certain percentages of the assessment plots
19 achieved the foliage protection standard, and you have
20 done that for both chemicals and B.t.; is that correct?

21 A. Yes, and again I've used this as an
22 illustration of the value of using a numerical
23 standard--

24 Q. All right.

25 A. --for doing that. That's right.

1 Q. So this table doesn't tell you then
2 whether or not you would have achieved that same level
3 of protection if you had not sprayed?

4 A. No, you're right, because what I've
5 used is the New Brunswick standard which is just an
6 absolute measure of the defoliation experienced in the
7 sprayed plots and it does not take into account
8 defoliation levels in unsprayed plots. To do that you
9 would have to use the Quebec calculation.

10 Q. All right. So again just to clarify,
11 achieving the standard doesn't necessarily relate to --
12 it's not as though you've achieved the standard because
13 you have sprayed, you might have achieved the standard
14 without spraying; is that a fair comment?

15 A. That's a characteristic of the New
16 Brunswick standard, that's right.

17 Q. Okay.

18 A. The way in which they generally
19 account for that, Ms. Kleer, is that they have fairly
20 rigorous pre-spray sampling programs, so that if there
21 is -- and they do use thresholds with respect to tree
22 condition and budworm population density, egg mass
23 density and so on - so that if they designate an area
24 for spraying they're fairly confident that in fact it
25 does need spraying to avoid being defoliated 50 per

1 cent or more, whatever that particular standard is.

2 Q. So then is it fair to conclude on
3 this point that the relative proportion which you've
4 shown in Table 14, for instance for 1983, three out of
5 eight of the B.t.k. treated balsam fir plots achieved
6 the protection standard, the 60 per cent protection
7 standard, that doesn't really -- do these data really
8 allow you to compare the effectiveness of B.t. and
9 chemicals?

10 You split it up that way in your Table
11 14, you have identified B.t.k. separate from chemicals.
12 Is it fair to say then that that Table 14 doesn't give
13 you an indication of or doesn't allow you to draw any
14 conclusions about the effectiveness of B.t. as compared
15 to chemicals?

16 A. I would say that's correct. I would
17 not want anyone to use Table 14 as a basis for
18 comparing efficacy of B.t. and chemicals, and I think
19 I've tried to make that clear on a number of occasions.

20 Q. Okay.

21 MS. KLEER: Now would be an appropriate
22 time for the break for me, if that's all right with the
23 Board, or would you prefer that I go on for a while?

24 MADAM CHAIR: No, that's fine, Ms. Kleer.

25 MS. KLEER: Thank you.

1 MADAM CHAIR: We will be back in 20
2 minutes.

3 MS. CRONK: Madam Chair, just before you
4 rise, so that it's clear on the record, and it may be
5 of some assistance to the Board, when I stood earlier
6 and said there were efficacy reports already before you
7 in their most current form, I referred you to Exhibit
8 659 dealing just with spruce budworm. That exhibit
9 contains the reports for 1985 through 1988 and Exhibits
10 660 and 661 contain the reports for 1983 and 1984 which
11 have been refiled by Ms. Kleer this morning.

12 So what you got this morning is a package
13 with the reports for 1981 through '84, you already had
14 '83 through '88. So that's I think of some assistance.

15 MADAM CHAIR: Thank you.

16 ---Recess taken at 10:00 a.m.

17 ---On resuming at 10:20 a.m.

18 MADAM CHAIR: Please be seated.

19 Ms. Kleer?

20 MS. KLEER: Q. Dean Carrow, at the risk
21 of repeating myself one more time, I will ask you just
22 a point of clarification. Is Table 14 only for the
23 purposes of showing the utility of having numerical
24 protection standards?

25 DEAN CARROW: A. As I said earlier, Ms.

1 Kleer, I think there are two purposes to that table.
2 The primary purpose certainly is to show the utility of
3 having a numerical protection standard; the second was
4 to show that in a very general sense there appears to
5 have been somewhat of a reduction in the effectiveness
6 of protection spraying programs on spruce since 1985
7 when the technology for spruce budworm control was
8 limited by the provincial ban on use of chemicals.

9 Q. So it's in a general sense only?

10 A. That's correct.

11 Q. So can you use Table 14 or the
12 reports upon which Table 14 was based to do a strict
13 comparison of the effectiveness of B.t. versus
14 chemicals?

15 A. Well, I am a little unclear as to
16 what you mean by a strict comparison. I guess we are
17 talking about various levels of rigor here.

18 Certainly as I've pointed out the plots,
19 as I understand them, the field plots which are used to
20 assess the effectiveness of operational programs are
21 not designed according to scientific criteria and
22 experimental design, certainly they wouldn't lend
23 themselves to statistical analysis, for example. So
24 depending on the level of rigor that you wanted to
25 apply to it.

1 As it turns out of course the operational
2 data or the operational assessment data really to a
3 large extent are the only data that are available. So
4 if one wants to assess the effectiveness or comparative
5 effectiveness, really the database is rather limited
6 and one would have to use that with the understanding
7 that there are some limitations on its statistical
8 value.

9 Q. If you can answer this: Are the
10 limitations using in this data for statistical purposes
11 severe limitations, in your opinion?

12 A. I think what we have is a situation
13 which we discussed very briefly prior to the break in
14 which there is a high degree of variability in the
15 data.

16 Certainly we're looking at population
17 densities which are highly variable, as you alluded to
18 in one of your questions, where we are dealing with
19 very light population densities in some cases and very
20 heavy population densities in others; we're dealing
21 with two different species of -- or two different genre
22 of trees, balsam and spruce; we're dealing with
23 situations in which trees and stands have different
24 histories of past defoliation and damage.

25 Those are just some of the variables

1 right there that would have to be incorporated into --
2 would have to be considered in such an analysis.

3 Q. So at this point in Ontario though
4 the best evidence that we have to draw any conclusions
5 at all with respect to effectiveness is this data here?

6 A. Well, certainly that is some of the
7 best data available bearing in mind that, as I said,
8 every year the provinces report at the Annual Pest
9 Control Forum so that at one point each year the
10 provinces are able to compare the relative level of
11 success they have achieved with their operational
12 spraying programs, many of them using very similar
13 technologies. And I think that has been an extremely
14 helpful experience for all jurisdictions in improving
15 the technology and the operational capabilities.

16 Q. Okay. A few other clean-up points.
17 Is it fair in your opinion to compare the results of
18 single applications and double applications of a
19 pesticide in terms of comparing effectiveness?

20 A. I think it's a fair comparison
21 provided you make that very clear, that what you are
22 doing is comparing one spray regime with another spray
23 regime; in other words, the prescription with Matacil
24 as an example is two applications of Matacil
25 approximately three to four days apart, at a specified

1 application rate and at a specified volume per hectare.
2 That is the spray regime which is prescribed for spruce
3 budworm control.

4 In comparison it can be compared with,
5 for example, fenetrothion or it could -- let me use
6 another example, it could be compared with Sevin which
7 is normally recommended as a single application at a
8 particular rate and a particular volume for budworm
9 control, or you could compare it with B.t. which has
10 historically been applied as a single application at
11 rates which, over the years, have increased I think in
12 an attempt to achieve a higher level of effectiveness.

13 So as long as you recognize that up front
14 that you're comparing spray regimes and not single
15 versus double application level.

16 MADAM CHAIR: So what you're saying, Dean
17 Carrow, is it's not the fact that Matacil has been
18 applied twice because there was some problem with the
19 application, but the fact that the labelling requires
20 it to have that spraying --

21 DEAN CARROW: No. What it allows, Madam
22 Chair, is that it allows for two applications, it
23 allows also for one application. The reason for the
24 double application usually is to overcome the
25 difficulties presented by budworm larvae that have the

1 bad habit of emerging over time; in other words, the
2 population does not all emerge and begin feeding at the
3 same point in time, in fact they emerge over a period
4 of several days or perhaps a week or 10 days, and the
5 double application has the value of being effective
6 against the population which is -- the first
7 application is effective against the population which
8 is actively feeding on that particular day, and then if
9 another application is put on three or four days later
10 it catches a different population.

11 Matacil has a fairly short residual
12 effect as well, so that an application that goes on on
13 day one loses much of its effectiveness by day four or
14 five.

15 MADAM CHAIR: But you don't have two
16 applications of Sevin or B.t.?

17 DEAN CARROW: No, that hasn't been the
18 standard, although my understanding is that resource
19 managers in recent years are looking much more
20 seriously at double applications of B.t., for example,
21 as an alternative.

22 The difficulty -- one of the difficulties
23 in the past has always been cost, and B.t. has come
24 through a period where it has been as high as three
25 times the cost of Matacil or fenetrothion and in an

1 attempt to keep the cost of B.t. down managers have
2 generally prescribed single applications.

3 It follows then if you ask for a double
4 application you probably may not double your costs but
5 you're going to increase them pretty substantially.

6 So the challenge was to try to develop a
7 B.t. technology that had a comparable cost
8 effectiveness to a technology that involved the
9 application of Matacil or fenetrothion in other
10 provinces.

11 MS. KLEER: Q. Jumping ahead a bit but
12 it's on the point, is it true that the cost of B.t. has
13 been dropping; the cost of the product itself has been
14 dropping other time?

15 DEAN CARROW: A. Yes, particularly since
16 the early 1980s it's been dropping, relative -- sorry,
17 relative to what the product price was in the early
18 1980s. I should qualify that, Ms. Kleer, by saying
19 that in the last three or four years I haven't tracked
20 the cost of B.t., so it may well have increased again.

21 I think the important thing was what was
22 the cost differential between B.t. and chemical, and
23 the gap that I mentioned earlier that B.t. was
24 approximately two and a half or three times as
25 expensive. That gap was closing between the cost of

1 chemical and the cost of B.t., so that it became a more
2 affordable alternative.

3 Q. So is the cost -- in the last four
4 years then, you would not be able to give me any
5 evidence as to what the cost differential is between
6 B.t. and chemical?

7 A. That's right. I can't comment on the
8 recent costs.

9 Q. Can anyone else who operates with
10 that do so?

11 MR. BUNCE: A. No.

12 Q. Is there any reason why not; is it
13 because you haven't use chemicals for the last --

14 A. It's not part of Industry's view to
15 spray the chemicals.

16 Q. Okay.

17 A. That's part of the MNR's job. So I
18 wouldn't know what the costs are.

19 Q. All right. I'd like to turn briefly
20 to the annual reports that were filed earlier as
21 Exhibit 1206A through D, and I'll look at 1206B for
22 1982.

23 And if we can turn to Table 6. To
24 illustrate a point that we discussed earlier, is it
25 true that the checks in two of the chemical plots

1 treated with Orthene as shown in Table 6 show that the
2 level of defoliation met the protection standard
3 without spraying; in other words, the checks were each
4 34 per cent?

5 DEAN CARROW: A. Yes, that's correct,
6 Ms. Kleer.

7 Q. And that is what I was trying to get
8 at earlier.

9 A. I think in fairness, however, this is
10 something that I should elaborate on a bit and it makes
11 reference to a discussion we had prior to the break.

12 These two areas refer to what are called
13 seed production areas, SPAs, and that's a particular
14 situation in which, because of a high value of that
15 particular stand which is the production of quality
16 seed, that in fact a different standard might very
17 logically be applied for protection.

18 I'm not saying that it is in this
19 particular case, I'm not stating that at all, I'm just
20 saying that this is a different type of situation and
21 it's one where it might be necessary to achieve a
22 higher level of protection in order to preserve the
23 seed crop that's produced in those particular areas.

24 Q. Well, if we can go to Table 8 in the
25 same report, the next page, 333, for Rogers Township

1 plantation No. 43 which was treated with Matacil, there
2 was a 35 per cent level of defoliation prior to
3 spraying indicated by the check, and again in that case
4 we have the example where defoliation levels were
5 already below the 60 per cent standard.

6 A. Yes, except that I'd want to point
7 out that it's not prior to the spraying, these
8 defoliations that are observed, of course, are observed
9 in July after the spray program is completed and it's
10 part of the assessment, so that it's a look after the
11 fact rather than before.

12 What the manager has before the fact is
13 the data or the data in the column labeled pre-spray
14 larvae per 46-centimetre branch tip, which is the
15 left-hand column, and if you look particularly at that
16 Rogers Township plantation 43, the situation there was
17 that there were about seven larvae per branch tip in
18 the treated plantation and about 24 in the check.

19 So that's the type of data that the
20 manager has to work with.

21 Q. Just for clarification, the pre-spray
22 larvae in the spray block was lower than in the check?

23 A. Mm-hmm, that's right, in that case it
24 was.

25 Q. All right. So then the checks

1 aren't -- the spray blocks are chosen prior to looking
2 at the pre-spray larvae, because I would imagine that
3 you would want to spray where you have a higher number
4 of larvae per branch tip?

5 A. Yes, and I don't know -- the check in
6 that particular case, Ms. Kleer, could simply refer to
7 a number of white spruce trees in that area that were
8 not part of the plantation; in other words, they may
9 simply be natural regeneration that's occurred
10 throughout the area. They probably would not be part
11 of a plantation, but they would be comparable trees.

12 Q. Right. Can we turn to the report for
13 1983, Exhibit 1206C and turn to Table 10, page 327.
14 Now, if you look at the Chelsea Hill moose yard data or
15 the second Chelsea Hill moose yard -- do you have this
16 in front of you? Page 327 Table 10?

17 For the Chelsea Hill moose yard, the
18 second line which deals with white spruce host, isn't
19 it true that the percentage defoliation in the spray
20 plot was higher after spraying than it was in the
21 check?

22 A. Yes, it was in that case, that's
23 right.

24 Q. Now, does it make sense to you to
25 report that the plot achieved the protection standard

1 even though without chemical spraying the check was
2 better?

3 A. Well, again, Ms. Kleer, I guess it's
4 a matter of which of those methods you want to use;
5 whether you want to use the New Brunswick method or the
6 Quebec method.

7 If, for example, one were to look at that
8 particular plot using the New Brunswick standard, which
9 in this case is white spruce; isn't it, so that the
10 standard for white spruce is 50 per cent, so it has met
11 the standard.

12 Q. Mm-hmm.

13 A. If you were to calculate that data
14 using the Quebec system it would have failed. So
15 there's just an example of what I'm illustrating, it
16 just depends which of those systems you want to use
17 because the Quebec system does take into account what
18 happened on the check plot.

19 Q. In your opinion, would it make more
20 sense to use a Quebec type of standard where you
21 compared what happened prior to spraying -- sorry, what
22 happened without spraying versus what happened with
23 spraying, or would you rather focus on having a
24 protection standard that achieves a certain level of
25 protection?

1 A. In my own personal view, I think if
2 you were concerned primarily with the protection of
3 older stands of balsam fir and spruce that were within
4 the 20-year management plan cycle; in other words, they
5 formed part of the commercial harvest and the purpose
6 is to keep them alive, then if you had to choose a
7 single system, then I think the Quebec system makes
8 more sense because it gives you that measure of
9 improvement that you have achieved due to spraying.

10 The reason I qualify that is, that if you
11 look at other classes of stands; for example, immature
12 plantations and so on where you are concerned with
13 optimizing growth, then in fact the research that has
14 been done to date ties the growth rates to levels of
15 specific defoliation, so that, for example, some
16 workers have found that with 50 per cent loss of the
17 current year's foliage. This tends to result in a
18 certain reduction in annual increment. So in that
19 particular situation the New Brunswick approach
20 probably would be of value.

21 And I guess what I'm saying is, maybe you
22 take both measurements anyways so you can use the data
23 in either way.

24 Q. So that this data then reported here
25 could have been used to come up with a table like Table

1 14 which in stead of assessing it in terms of the New
2 Brunswick protection standard -- or sorry, preservation
3 standard could have been formulated to look at how much
4 per cent was preserved -- sorry, was protected as
5 between checks--

6 A. Yes, exactly.

7 Q. --and spray blocks?

8 A. That's right. And that's what's
9 contained I think in your summaries here that you have
10 presented has attempted that.

11 Q. Okay. While we're on that point,
12 just as a point of clarification. Looking at Exhibit
13 1205, do you accept that the evidence summarized in the
14 tables -- sorry, not everything, but the summary at the
15 bottom which compares foliage protection standards
16 using 60 per cent and 30 per cent, is in fact an
17 accurate representation of what was contained in the
18 tables contained in the reports?

19 A. I can't confirm that at this point,
20 Ms. Kleer, because I looked particularly at the summary
21 information and went back to the original reports to,
22 in other words, to determine the number of plots that
23 were involved and the number that succeeded the minimum
24 standard. So I can't comment on the information above
25 the summary.

1 Q. All right. Can you comment on the
2 validity or the correctness of the summary data for
3 each of the years '81 through '84?

4 A. Yes. Yes, I can.

5 Q. If you would do so, I'd appreciate
6 that.

7 A. In the 1981 defoliation data -- I
8 guess, should we go through this line-by-line?

9 Q. I think we should go through it
10 line-by-line, if we could.

11 MS. KLEER: Do we have this in front of
12 us?

13 MADAM CHAIR: Exhibit 1205?

14 MS. KLEER: Yes.

15 DEAN CARROW: The 1981, the table that's
16 titled: 1981 per cent defoliation at the bottom of that
17 page is the summary. The first line reads: Balsam fir
18 or Bf 60 per cent foliage protection B.t., 8 out of 11,
19 73 per cent, chemical, 2 out of 2, 100 per cent.
20 That's in agreement with the data that I calculated.

21 The second line reads: Bf 30 per cent
22 foliage protection B.t., 11 out of 11, 100 per cent.
23 My calculations using the arithmetic calculation of
24 Quebec is that should read 8 out of 11 or 73 per cent.

25 And reading across that line: Chemical,

1 2 out of 2, 100 per cent is correct. Going to the
2 third line --

3 Q. If I can just clarify for the sake of
4 the Board, when you talk about the arithmetic
5 calculation you mean comparing between the spruce --
6 sorry, between the check and the sprayed plot?

7 A. That's right.

8 Q. And then if it achieved greater than
9 30 per cent -- well, perhaps you could explain it.

10 A. All right. In that particular line
11 Bf 30 per cent foliage protection, what we're doing is
12 measuring -- or determining the number of plots which
13 achieved a foliage protection standard of 30 per cent
14 or better, and the number of plots for B.t. was 8 out
15 of 11 or 73 per cent; for chemical, the number of plots
16 was 2 out of 2 or a hundred per cent.

17 Q. And moving on to white spruce, 50 per
18 cent?

19 A. Yes. White spruce 50 per cent
20 foliage protection B.t., you have 16 out of 18, 89 per
21 cent; and I have that as 12 out of 14, 86 per cent.

22 Q. For white spruce 30 per cent foliage
23 protection, what were your results?

24 A. And, sorry, reading across that line,
25 Ms. Kleer, 9 out of 9, a hundred per cent is correct.

1 Q. Okay.

2 A. White spruce 30 per cent foliage
3 protection B.t., should read 11 out of 18 for 61 per
4 cent instead of 18 out of 18 for a hundred per cent.

5 Q. All right. Can we just go back to
6 the 50 per cent foliage protection, because you had 12
7 out of 14 for the 50 per cent foliage protection
8 standard.

9 Now you had 14 plots there and you have
10 18 plots for the other white spruce figure. Is there a
11 reason why those two total number of plots are
12 different?

13 A. That is why I'm consulting my notes
14 here because --

15 MS. KLEER: Perhaps it might be helpful
16 for the sake of the Board to get a comparison between
17 Quebec foliage protection standards and the New
18 Brunswick standards and how they work, for an
19 undertaking that you prepare a summary table like this
20 for the years 1981 to '84 and then just present it at a
21 later time. Is that acceptable?

22 MS. CRONK: Well, if Dean Carrow has
23 already done that I take no objection to it, but I do
24 have some difficulty with the procedure that has been
25 followed here and, that is: That summary tables

1 prepared either by Ms. Kleer or her advisors have been
2 put to him for confirmation. He has started to give
3 her some amendments to that based on how he has checked
4 it.

5 If it's just a question of typing up what
6 he's done, I'll see that that's mechanically done, I
7 don't have a problem with it, but I do have a problem
8 with him being asked at this stage, rather than prior
9 to his evidence where he had an opportunity to do it,
10 to go away and to do what essentially will form part of
11 her case. I have some problem with that.

12 MS. KLEER: Well, if he's already done
13 that --

14 MS. CRONK: I have no objection.

15 MS. KLEER: I'm only doing it for the
16 purposes of speeding up the evidence going in.

17 MS. CRONK: I have no objection at all if
18 he's already done that.

19 MS. KLEER: Q. Have you already done
20 that, Dean Carrow?

21 DEAN CARROW: A. Yes, I have.

22 MS. KLEER: So then if we could just get
23 an --

24 MS. CRONK: You have?

25 DEAN CARROW: Mm-hmm.

1 MS. KLEER: Thank you.

2 DEAN CARROW: So my understanding is that
3 it will be typed up and then presented to the Board; is
4 that correct?

5 MS. KLEER: Yes.

6 MADAM CHAIR: I do have a question, Dean
7 Carrow. Why would the denominator in white spruce with
8 50 per cent foliage protection, why would you have a
9 difference in denominators from...

10 DEAN CARROW: I was trying to check my
11 own notes, Madam Chair, and I think where the
12 difficulty -- there are two things that are a
13 possibility here; one is that in looking through some
14 of those tables there are certain applications that are
15 listed as experimental applications, and I'm just a
16 little confused right now as to whether those were --
17 whether Ms. Kleer has included those as part of her
18 total number and whether I have included them or not.

19 I would really -- I will have to go back
20 to the original reports and see whether experimental
21 applications have been included, and perhaps footnote
22 that to make sure that we're talking about the same
23 thing.

24 What I have tended to do throughout that
25 is to exclude experimental applications simply because

1 they are put on under quite different circumstances.

2 So if that's agreeable to the Board, I would construct
3 that based on exclusion of experimental data, if that's
4 your wish.

5 MS. KLEER: That would be fine.

6 MADAM CHAIR: Yes. Thank you, Dean
7 Carrow.

8 MS. KLEER: Thank you.

9 Q. All right. Now, if we can turn to
10 1984, Exhibit 1206D, and if you can turn to Table 10.

11 DEAN CARROW: A. This is the 1984 data?

12 Q. Yes. Table 10 which is at page 268.
13 Perhaps this is an illustration of data which you did
14 not include in your summary of -- sorry, in your Table
15 14.

16 This indicates at the top of the table
17 Population Reduction, People Survival and Foliage
18 Protection Attributable to Single Applications of
19 Various Experimental B.t. Formulations on Balsam Fir in
20 Rogers Township.

21 Would those experimental results have
22 been included in your Table 14, just for the sake of
23 clarification?

24 A. No, they weren't. For the purpose of
25 the record, Ms. Kleer, I included Tables 7, 8, 9 and

1 12; Tables 10 and 11 are experimental so I didn't
2 include them.

3 Q. Now, just looking then at Table 10
4 for a moment, can you confirm that none of the checks
5 on this table that dealt with balsam fir treatments
6 with B.t. met the foliage protection standard of 60 per
7 cent. This is just for the check plots.

8 A. Yes, that's correct, the checks all
9 exceeded the 60 per cent defoliation standard.

10 Q. And is it also true that in all 13
11 applications where B.t. was applied that the 60 per
12 cent defoliation standard was met after spraying?

13 A. Excuse me, can I back up a bit,
14 because I think again we're getting mixed up in the
15 terminology here.

16 If we're to look specifically at the
17 standard that you are using, which is 60 per cent, and
18 that is 60 per cent foliage preservation.

19 Q. Preservation, pardon me.

20 A. And if we look at the defoliation
21 column, then it should be 40 per cent or less.

22 Q. That's right.

23 A. Okay. So they are all over 40 per
24 cent. Just to make sure that the record is clear on
25 that.

1 Q. Sorry, all the sprayed plots are
2 under 40 per cent?

3 A. Well, I was looking at the checks.

4 Q. Oh, okay.

5 A. You asked me about the checks and the
6 checks are all over 40 per cent and the spray blocks
7 are all 40 per cent or less, that's correct.

8 Q. So does this table then support your
9 former statement that B.t. in various formulations is
10 effective in controlling spruce budworm on balsam fir?

11 A. Again it's another field trial which
12 just I think affirms that under these particular
13 conditions the various B.t. formulations that were
14 being tested at those particular rates were effective
15 at meeting this end.

16 Q. All right. If we can turn to page 19
17 of the same report, and if you could read over the
18 first paragraph for a moment, especially focussing on
19 the last two sentences.

20 A. Yes.

21 Q. Does this indicate that several
22 different B.t. formulations gave significant foliage
23 protection for both balsam fir and white spruce?

24 A. That's what the report says.

25 Q. And that was so according to the

1 report, even despite the fact that adverse weather
2 conditions caused a delays in treatments; is that
3 correct?

4 A. Again, that's what the authors say in
5 this report.

6 Q. All right. Well, based upon that
7 report and looking at their evidence, is the conclusion
8 that they reached with respect to this particular set
9 of white spruce treatments not, in your opinion,
10 indicate that improved formulations of B.t. may in fact
11 be acceptable and effective against white spruce?

12 A. Well, what this represents, Ms.
13 Kleer, is one year's field trials and certainly I would
14 agree that based on the data presented in Tables 10 and
15 11, the results are encouraging, and I guess it
16 indicates the potential for improvement in B.t.
17 formulations through the use of improved strains and
18 better, more effective product formulations. Certainly
19 those particular results in 1984 are encouraging.

20 Q. I'm completing my review of these
21 exhibits, 1206A through D. Now, if we can turn to your
22 evidence, your written evidence -- I don't have the
23 exhibit number for Panel 7.

24 MADAM CHAIR: 1131.

25 MS. KLEER: Q. All right. Now, if we

1 can turn to page 182. You have indicated at page 182
2 at the top in the first paragraph that the levels of
3 protection for balsam fir using just B.t. versus using
4 B.t. and chemicals was approximately the same; is that
5 correct?

6 DEAN CARROW: A. That's correct.

7 Q. All right. And the figure of 70 per
8 cent of balsam fir plots for the years prior to 1985
9 using 60 per cent protection -- sorry, preservation
10 standard is an average of all of the figures for the
11 years '79 to '84 including chemical and B.t.; is that
12 correct?

13 A. Yes, that's correct.

14 Q. So you have combined both chemical
15 and B.t.?

16 A. Combined them both, that's correct.

17 Q. All right. Would you happen to have
18 a calculator handy. I've worked out the figures
19 myself, but I'd like to just look at, comparing B.t.k.
20 versus chemicals and looking just individually at each
21 of those. Would anybody happen to have a calculator?

22 A. I have a calculator, Ms. Kleer.

23 Q. You do. Okay. Could you just average
24 the levels of protection looking at the balsam fir now
25 for the years '79 to '84 using just B.t.k.

1 MADAM CHAIR: From Table 14, Ms. Kleer?

2 MS. KLEER: Yes, from Table 14.

3 Q. I'll let you work it out and then...

4 MADAM CHAIR: And this calculation is
5 with respect to the statement in the first paragraph on
6 page 182?

7 MS. KLEER: Yes.

8 MS. CRONK: Can Ms. Kleer clarify for me
9 what calculation is being done? We were scrambling to
10 look for a calculator here and I lost part of the
11 question.

12 MS. KLEER: Sorry. It's looking at just
13 the B.t. data for balsam fir for the years '79 to '84.

14 MS. CRONK: Thank you.

15 DEAN CARROW: Just for balsam fir?

16 MS. KLEER: Q. Yes. Sorry.
17 I'll do the same later for white spruce, but at the
18 moment could you give me what your result was for just
19 the balsam fir?

20 DEAN CARROW: A. And this is for the
21 years '79 to '84 inclusive?

22 Q. Right.

23 A. I make that for B.t. on balsam fir it
24 achieved the standard on 26 of 35 plots.

25 Q. Sorry, I was just taking -- averaging

1 the percentages.

2 A. Oh, I wouldn't want to do that.

3 Q. You wouldn't want to do that, okay.

4 A. No, percentages are problem enough
5 without averaging them.

6 Q. All right. So you did it for plots?

7 A. Yes. If you accumulate all of the
8 plots that were treated with B.t., balsam fir from '79
9 to '84, 26 of the 35 plots met the standard.

10 Q. All right.

11 A. Which is 74 per cent.

12 MADAM CHAIR: 26 of 29 plots, Dean
13 Carrow?

14 DEAN CARROW: 26 of 35, Madam Chair.

15 MS. KLEER: Q. Well, just for your
16 interest, using percentages alone it's not that far off
17 from what you got but...

18 All right. Can you do the same when you
19 just compare -- sorry, '79 to '84 using just chemical
20 insecticides and focusing on balsam fir alone.

21 DEAN CARROW: A. On balsam fir, using
22 chemicals alone, it is 9 plots out of 16 achieved the
23 standard.

24 Q. All right. And as a percentage?

25 A. 56 per cent.

1 Q. Would you agree that it appears that
2 B.t. is more effective than chemicals in terms of the
3 balsam fir plots?

4 A. Again, I think without going back to
5 the original data and looking at it, Ms. Kleer, it's
6 not an appropriate generalization to make. It may well
7 be true, but I would not want to make that on the basis
8 of that table particular table.

9 Q. Well, I'm not sure why because --
10 well, perhaps you can explain why you wouldn't want to
11 make that comparison?

12 A. Well, I think, again, I would want to
13 go back and look at the results of those individual
14 years more clearly and just see, for example -- we've
15 mentioned earlier some of the obvious difficulties that
16 are presented by situations in which you have very,
17 very low population levels.

18 In my personal view, and it is a personal
19 view as a scientist, I think there are a number of
20 those cases where the results are anomalous because
21 they are created by -- sorry, the results are
22 misleading because they are created by anomalous
23 situations and it may be in which you have one larva on
24 a branch or if in fact you had two larvae on a branch
25 and you end up with one you have got a 50 per cent

1 control, and that's the danger in this type of
2 calculation, is that you get into types of data which
3 are really quite weak if you are trying to
4 statistically or credibly validate something.

5 So I think obviously the data that is the
6 strongest is the data that involves the largest number
7 of plots, so that you've got a much broader sample and
8 the data that involves higher levels of budworm
9 population density as well. So you're dealing with
10 situations in which the chances of anomalies showing up
11 are considerably less.

12 Q. Would it be fair to say, though, that
13 in a general sense, looking at what we've just done,
14 that B.t. is more effective on balsam fir than are
15 chemicals? Would you be willing to make that
16 statement?

17 A. I have real difficulty with that type
18 of statement and it's only because I know the nature of
19 the data. And I am not trying to be evasive at all,
20 Ms. Kleer, but if you would reverse the question I
21 would answer exactly the same way because I think it's
22 a poor way to approach that particular analysis and I
23 would not want to leave that with the Board as a
24 general statement.

25 I think we have said in the evidence, and

1 I have certainly said it a number of times orally, that
2 B.t. performs generally very well on balsam fir. There
3 are too many other considerations when one tries to
4 compare product A versus product B. There are too many
5 consideration out there besides the product itself that
6 influence the results, and I've mentioned a couple of
7 them, a couple of them that are biological.

8 But certainly in any given year if you go
9 back and look at the reports of spraying programs, you
10 will ordinarily find that there were some difficulties
11 encountered in those spray programs. And before making
12 generalizations I would want to be sure that those
13 difficulties were taking into account and, again, it
14 does not relate to the product, it's simply a factor
15 that's involved in operational spraying programs.

16 Q. Well, then, let's go back to your
17 former statement. You had indicated earlier, and
18 correct me if I am wrong, that in a general sense this
19 data -- or in a general way this data could be used to
20 show that prior to '85 things were better when you had
21 B.t. and chemicals than they were after 1985 when only
22 B.t. was available.

23 Can you now, given what you've just said,
24 make that same general conclusion?

25 A. The only point I was trying to make

1 with that, Ms. Kleer, was with respect to spruce alone.
2 It was interesting that based on that there is about a
3 30 per cent reduction in level of success after 1985
4 when one of the major technologies for control of
5 spruce budworm was not available.

6 Q. But you're still using the same
7 database to make that conclusion and, as you've said,
8 you can't use that database to make the general
9 conclusion that B.t. is more effective on balsam fir --
10 sorry, B.t. is more effective than chemicals on balsam
11 fir, and I am having difficulty understanding how you
12 can reach the general conclusion comparing -- you know,
13 making that 30 per cent comparison -- well, I'm getting
14 confused.

15 But I have trouble making both
16 comparisons -- or reaching your conclusion that you
17 reach earlier and I just want to ask you whether you
18 have trouble with that too based upon the limitations
19 of the database?

20 A. Well, from my viewpoint it is quite a
21 different comparison. The first one you asked about,
22 as I understood it, was a direct comparison between the
23 technology of B.t. versus chemicals and that's the one
24 I have difficulty with without having -- without going
25 back and looking very carefully at the particular

1 results that were recorded in the literature and the
2 conditions under which those spray programs were
3 carried out.

4 The latter one refers only to a situation
5 in which we are dealing with a reduced technology. I
6 am not trying to compare B.t. and chemicals at all, I
7 am simply saying that in a situation in which the
8 resource manager has only one registered pesticide to
9 deal with all of the situations that he or she
10 encounters, that it appears that there is somewhat of a
11 reduction in the level of success of those particular
12 operational spraying programs, and I don't think that
13 should be too surprising given the variability of
14 conditions that the manager has to face in terms of
15 variable population density, in terms of prior history
16 of damage, in terms of species, age class of material
17 and so on.

18 Q. But you are still --

19 MR. MARTEL: Can I ask a question.

20 MS. KLEER: Sorry.

21 MR. MARTEL: But doesn't that lead one to
22 the conclusion, though, that if you eliminate the
23 chemical, if that's the result that occurs, you are
24 going to have a reduction?

25 And it is a conclusion that once you

1 remove the chemical your efficiency drops by 30 per
2 cent and the conclusion is pretty -- well, it sounds
3 strangely general to me that there is a comparison
4 without a comparison being made. Maybe I am inferring
5 something.

6 I am not saying you're saying it, I'm
7 simply saying, if one draws the conclusion from a
8 reduction of 30 per cent, one has to assume it's
9 because the chemicals have been withdrawn.

10 DEAN CARROW: Well, I think, Mr. Martel,
11 it is consistent with evidence that was presented by
12 the Ministry of Natural Resources' witnesses along this
13 line in which Mr. Churcher I think made the point that
14 it was recognized that it is more difficult to achieve
15 protection on spruce with B.t. than on balsam fir.

16 And, in fact, the point of this
17 particular discussion, relative to Table 14, is simply
18 to say it is interesting to note that as you go through
19 the 11 years of data there doesn't seem to have been
20 much a change in the level of success or the rate of
21 the success on balsam fir regardless of whether B.t.
22 and chemicals were available or just B.t. was
23 available, but when you look at spruce, there does
24 appear to be a general decline in the rate of success
25 following 1985, and that's consistent again with

1 reports that have been -- rather, evidence given to the
2 Board.

3 MR. MARTEL: But you don't make a
4 generalization that it is because -- I mean, you are
5 not going the extra step?

6 DEAN CARROW: Well, it's my personal view
7 that it is because there is a loss in technology.
8 There is a major technology here that's been denied the
9 manager and that is, namely, chemical insecticides.

10 MS. KLEER: Q. I am just going to go
11 back --

12 DEAN CARROW: A. And all I'm saying
13 here, Ms. Kleer, is that there are many situations in
14 which B.t. can do the job on white spruce, there are
15 some situations in which B.t. cannot do the job
16 adequately.

17 Q. All right. But still you are using
18 this data that you summarized in Table 14 to make that
19 conclusion, but you've already indicated to me that
20 there are problems with the database in terms of low
21 levels of pre-spray populations being included in this
22 table.

23 So it seems to me you're drawing a
24 conclusion that that 30 per cent drop is due to having
25 chemicals taken away as a management choice, and yet

1 you are using the database that you say is flawed -- or
2 is not flawed, but it has limitations.

3 A. It has limitations. It has
4 limitations for the purpose of drawing a general
5 conclusion with regard to comparing B.t. and chemicals.
6 The right-hand column really just illustrates what I
7 think is a fairly substantial decline in general level
8 of success post 1985, and it is interesting that
9 coincides with the period when chemicals were not
10 available to the resource manager.

11 I think you are trying to perhaps infer
12 more from that conclusion than is intended. It's
13 certainly intended to make a comparison between B.t.
14 and chemicals.

15 Q. Let me ask you another question
16 related to that data. You've drawn this 30 per cent
17 reduction in protection level conclusion, wouldn't it
18 be more proper to compare across years, using B.t.
19 versus chemical, in terms of -- if you were doing a
20 scientific study because of the very serious role that
21 climate plays in determining how effective B.t. and --
22 well, how effective B.t. will be?

23 A. Could you rephrase that question? I
24 am not sure I understand what you are telling me.

25 Q. All I'm saying is you have drawn the

1 conclusion comparing 1985 to '88 to the prior years. I
2 am asking, is it fair to draw that conclusion if you
3 haven't looked at the climatic data and analysed the
4 climatic data and how that might have affected the
5 results in terms of effectiveness?

6 A. Well, I would think it should have
7 affected the balsam fir results as well--

8 Q. All right.

9 A. --in those years.

10 MADAM CHAIR: You are saying, Dean
11 Carrow, that the climatic effects are not essentially
12 what makes B.t. not highly effective in protecting
13 black spruce? You are saying that --

14 DEAN CARROW: I think what Ms. Kleer is
15 getting at, if I've understood her correctly, Madam
16 Chair, is the local weather conditions that affect the
17 success or failute -- affect the success of spraying
18 programs and all I'm saying is that--

19 MADAM CHAIR: It should apply equally.

20 DEAN CARROW: --it should apply to balsam
21 fir and spruce equally because they are part of the
22 same operation.

23 MR. KLEER: Q. Now, isn't it true,
24 though, in 1985, just looking at that data for the
25 moment and this is actually set out in your data, that

1 the poor results obtained in '85 were due to delays in
2 spray operations caused by weather conditions which
3 were unsuitable for aerial spraying, and that you see
4 low levels of plots achieving the foliage protection
5 standard for both balsam fir and spruce, just looking
6 at 1985?

7 I'm sorry, I'm looking at table 14. If
8 you could just look at the data for a moment.

9 DEAN CARROW: A. Yes, I think it would
10 be fair to - particularly based on the report in the
11 Forest Pest Control Forum, that points to -- points
12 specifically to the poor weather conditions of 1985.

13 Q. Now, you also --

14 A. So there is an example of where it
15 apparently affected the results on both balsam fir and
16 spruce.

17 MADAM CHAIR: And you would assume that
18 that would hold as well if chemicals been sprayed, not
19 to the same extent?

20 DEAN CARROW: Against both species of
21 trees? Yes, I would think so.

22 MS. KLEER: Q. Now, if we could also
23 look still at Table 14 for '86 and '87. If you compare
24 the percentages of plots, they appear to be fairly --
25 sorry, the percentage of the plots obtaining the

1 foliage protection standard, it appears that they are
2 quite similar between balsam fir and spruce?

3 DEAN CARROW: A. That's right.

4 Q. But you have indicated just earlier,
5 I thought, that you didn't see -- you saw a different
6 result for balsam fir as compared to white spruce; am I
7 not...

8 I thought you had just said earlier that
9 you would have expected -- if weather were a factor
10 which affected the effectiveness, you would expect to
11 see a similar effect on balsam fir and spruce; in other
12 words, that both of them would be similarly reduced,
13 but yet if I look at the data for '86 and '87, does the
14 data bear out that conclusion?

15 A. No, I think you're perhaps
16 misinterpreting the comparison I was making, Ms. Kleer.
17 I said that if you looked at the results for balsam
18 fir, all of the results for balsam fir prior to 1985,
19 took all of those plots, then 70 per cent of those
20 plots met the standard. After 1985, 67 per cent of all
21 those plots met the standard which to me is close
22 enough to be the same.

23 So that there is equal -- there is a
24 similar level of success pre- and post-1985 on balsam
25 fir. When you do the same thing with the spruce data,

1 you observe that there is approximately a 30 per cent
2 lower level of success post-1985 as compared to pre --
3 yes, that's right, pre-1985.

4 Q. Now, would it make sense to drop out
5 data where weather was an effect; in other words, if
6 you looked at the '85 data, we know, according to the
7 evidence, that poor results were caused by weather
8 conditions in 1985, and you've just said that if you
9 had used chemicals you would have expected that you
10 would have gotten poorer results as well?

11 If you had taken -- would it be fair to
12 say that it's not really appropriate to include the '85
13 data in comparing the years '85 to '89 and the years
14 prior to '85?

15 A. I think it would be highly
16 inappropriate to excluded data on the basis of poor
17 weather conditions, Madam Chair, Mr. Martel, largely
18 because that's a given, that's something that a manager
19 has to deal with year by year and he or she can do
20 absolutely nothing about.

21 In fact, those of us who have been
22 involved in operational spraying say that it is sure to
23 on happen, you are going to have bad weather. And, in
24 fact, the analyses that have been done of operational
25 spraying programs show that the opportunities for

1 actual spraying under conditions -- weather conditions
2 that are considered acceptable, are relatively low,
3 relatively few.

4 So my point simply is that that is a
5 given background against which you operate year by year
6 and it affects planting operations and a whole bunch of
7 forestry activities. And the product or the technology
8 used in the spray program has to be successful in the
9 context of those conditions. So you are faced with
10 that challenge that you have got variable weather
11 conditions, some of them which make the spraying
12 difficult, but you have to come up with delivery
13 systems with product formulations and so on that, in
14 fact, enhance the probability of success under those
15 conditions.

16 So I think it would be very inappropriate
17 to put -- to exclude those that have been affected by
18 weather.

19 Q. All right. But if you had used
20 chemicals in '85 and you had had that data available to
21 you, to compare to the years in which you didn't have
22 chemicals or -- sorry, when you didn't use chemicals,
23 you would have expected that you would have gotten a
24 lower overall percentage of plots achieving the
25 protection standard; is that fair to say?

1 A. That could be, that could be. I
2 point out in the evidence, Ms. Kleer, on page 128, that
3 success or failure in one year may be attributing
4 factors, in addition to those associated with the
5 nature of the insecticide. So whether it is B.t. or
6 chemical may not make much of a difference.

7 The one thing that comes to mind,
8 however, is that some chemicals do have the advantage
9 of having some localized systemic activity; that is,
10 when they are applied to the foliage small amounts of
11 those chemicals are absorbed into the foliage and
12 retained in the foliage for some time, thus making them
13 effective over a period of several days.

14 And if there is a rainfall, for example,
15 shortly after spraying, the material that's on the
16 surface of the needles generally is washed off, the
17 material that is absorbed within is kept there. One of
18 the difficulties with B.t. historically has been that
19 if rain follows a spray program, then you lose a
20 certain -- perhaps a major proportion of the spray and,
21 indeed, with some chemical applications the same thing
22 applies.

23 Q. Let me ask a different question. In
24 the typical operational forest, do you find mixed,
25 balsam fir and white forest? Is that a typical

1 situation?

2 A. That's very typical.

3 Q. All right. So if you had to spray an
4 operational forest you would expect to achieve a higher
5 level of protection on that forest than if you were
6 spraying a forest of just white spruce alone, is that
7 correct, using B.t.?

8 A. Sorry, could you restate that?

9 Q. All right. If you have a forest, an
10 operational forest that contains both white spruce and
11 balsam fir and you spray it with B.t., would you expect
12 to achieve a higher level of protection, assuming
13 everything else is the same, when you compare the
14 results to a forest of white spruce only?

15 A. No, I wouldn't expect that at all,
16 necessarily. I think one of the difficulties again
17 which I presented in my oral evidence, Ms. Kleer, is
18 that we have a situation here in which the phenology of
19 those two tree species is quite different.

20 Balsam fir flushes and buds open sooner
21 than white spruce, the foliage expands and grows more
22 quickly and budworm larvae feed openly on balsam fir
23 foliage before they'd feed openly on white spruce
24 foliage. So that at any particular day what you
25 typically will find is a situation in which balsam fir

1 foliage is exposed, budworm are feeding openly on the
2 foliage. On the spruce trees, the buds may be still
3 closed or just partially opened and the larvae will be
4 feeding within the buds, they're not exposed. If an
5 application of B.t. is put on on that particular day,
6 it is going to be more effective on balsam fir than on
7 white spruce.

8 In New Brunswick, for example, where the
9 Industry relies very heavily on balsam fir, the
10 spraying programs are timed to optimize protection on
11 balsam fir and they take whatever protection they can
12 get on spruce.

13 If your objective was to optimize
14 protection on spruce, then I think it follows you would
15 time your application later, you would accept that you
16 are going to lose a fair amount of foliage of balsam
17 fir, you are going to write that off, if you want, just
18 accept the damage, but you can improve the performance
19 depending on which species you want to target the
20 application to and time it appropriately to coincide
21 with the phenology of that particular tree species.

22 Q. If you were to use then a double
23 application of B.t., in that instance you might expect
24 to obtain a better level of protection -- a higher
25 level of protection for the forest as a whole?

1 A. For the combined forest as a whole,
2 yes, I would expect that in this case.

3 Q. All right. Then I just want to go
4 back to your statement at page 182 that says:

5 "Before 1985 the MNR achieved a
6 protection level of 50% for spruce on
7 84% of the plots. Since 1985, when only
8 B.t.k. has been used, that protection
9 level has been attained on only 55% of
10 the assessment plots."

11 Was this statement then meant to suggest
12 that B.t. is less effective than chemicals for the
13 treatment of spruce budworm affecting white spruce
14 plots, or was it not meant for that purpose?

15 A. I'm sorry, could you ask that again,
16 Ms. Kleer, please?

17 Q. Was this statement meant to suggest
18 that B.t. is less effective than chemicals for the
19 treatment of spruce budworm affecting white spruce
20 plots?

21 A. As I've said earlier, the main
22 intention of that comparison was to show the relative
23 level of success when the manager has both microbial
24 and chemical technology available as compared to a
25 situation when only microbial technology is available.

1 In the latter case, the statement is meant to suggest
2 that in that case the capability for protection is
3 less.

4 Q. Now, if you were to do a study
5 comparing B.t. and chemical effectiveness in achieving
6 foliage protection, would it be in your opinion -- and
7 you were to design this study, would it be in your
8 opinion most appropriate to compare results within a
9 given year? That's the first point.

10 A. Well, I would think --

11 Q. Just as a statistical, a properly
12 designed test.

13 A. If the purpose of the experiment is
14 to do a straight comparison of product A versus product
15 B - B.t. and chemical for example - then I think it's
16 imperative that you have applications put on under
17 conditions which are as identical as possible, which
18 means the same time.

19 Q. Okay. And then the data in Table 14
20 which you have summarized as you've said earlier, is
21 not data that comes as a result of controlled
22 experiments like that?

23 A. No. No, it isn't.

24 Q. All right. I would like to get to
25 another area looking at the characteristics of B.t.,

1 although I'm not talking about B.t. and chemicals, I'm
2 just talking now about B.t.

3 Would you agree that the real cost for
4 B.t. products have been decreasing over the years and
5 up until as late as 1989, or can you make that
6 statement?

7 A. I'm more familiar with the time
8 period from -- oh, up to about 1985, Ms. Kleer, and in
9 that particular time period I know that the unit cost
10 of B.t. was dropping quite noticeably from year to
11 year, largely as a result of competitive bidding.

12 Q. And has that competitive bidding
13 continued from '85, or can you make that statement?

14 A. As far as I know it has.

15 Q. So you would expect then that, or
16 would you expect that the price would have dropped
17 then?

18 A. Well, I imagine there comes a bottom
19 point when the unit cost can't go much lower but, as I
20 say, since 1985 I'm really not familiar with the degree
21 to which those prices have or the price trends.

22 Q. Is anyone else on this panel at all
23 familiar with that?

24 MR. FERGUSON: A. No.

25 MR. BUNCE: A. No.

1 MR. STANCLIK: A. No.

2 Q. Mr. Smith, for the record?

3 MR. SMITH: A. No.

4 Q. Now, I'd like to turn to Exhibit 632,
5 Panel 13, OFIA Interrogatory No. 8 which I hope the
6 Board has with them, and I'm going to look specifically
7 at the paper entitled: B.t. and the Spruce Budworm,
8 1983.

9 MADAM CHAIR: Which question, Ms. Kleer?

10 MS. KLEER: It's No. 8 and specifically
11 there is a paper attached to that interrogatory, the
12 first page of which shows B.t. and the Spruce Budworm,
13 1983.

14 DEAN CARROW: I'm sorry, Ms. Kleer, I'm
15 lost on this particular document that you're referring
16 to.

17 MS. KLEER: You don't have that. Well,
18 I'll just show you it.

19 MADAM CHAIR: Is that Table 2?

20 MS. KLEER: It's this one here.

21 (indicating)

22 DEAN CARROW: Yes. I don't have a copy.

23 MS. KLEER: You don't have a copy.

24 DEAN CARROW: You didn't give me a copy
25 of that.

1 MS. KLEER: No, no, it was something
2 that --

3 MS. CRONK: I don't think --

4 MADAM CHAIR: We don't have that in our
5 package.

6 MR. FREIDIN: I think the problem may
7 have been that the article.

8 MS. CRONK: Didn't get filed.

9 MR. FREIDIN: The article was not
10 always --

11 MS. CRONK: The article is not part of
12 the exhibit.

13 MADAM CHAIR: Ms. Kleer, do you want to
14 take a look at what we have as Exhibit 632.

15 MS. KLEER: Right. Just for information,
16 I had checked with Ms. Devaul and she indicated she
17 thought it was part of it, but...

18 MADAM CHAIR: This is in Question 8 and
19 then we go into --

20 MS. KLEER: Oh yes.

21 ---Discussion off the record

22 MS. KLEER: Well, perhaps we can look at
23 this after lunch and I will get copies of it. I
24 thought it had been filed.

25 MS. CRONK: Sorry, could I just clarify.

1 It is part of the Board's copy of the exhibit?

2 MADAM CHAIR: No.

3 MS. CRONK: Because it isn't part of
4 ours.

5 MADAM CHAIR: No, it's not part of ours.

6 MS. CRONK: So may I know which article
7 it is and then we'll make sure it's available.

8 MS. KLEER: It's called: B.t. and the
9 Spruce Budworm, 1983 and within that, the article is
10 Operational Use of B.t. Against Spruce Budworm in
11 Ontario, 1979 to '83 and it's an article by Howse,
12 H-o-w-s-e, Nicholson and Meting, M-e-a-t-i-n-g. It was
13 actually referred to in the answer to the
14 interrogatory.

15 MADAM CHAIR: Would you like to make this
16 an exhibit?

17 MS. KLEER: Yes.

18 MS. CRONK: Have we determined -- I'm
19 sorry.

20 MADAM CHAIR: Is questioning going to be
21 extensive on this document?

22 MS. KLEER: Not extensive.

23 MS. CRONK: Could we determine whether
24 the witness is familiar with the document. I certainly
25 didn't provide a copy of that to Dean Carrow because I

1 didn't know this particular document was -- I gave him
2 a copy of Exhibit 632, not this.

3 So if he's read it, fine; if he hasn't,
4 perhaps we should find that out.

5 MS. KLEER: Well, he was editor of the
6 report, so...

7 MS. CRONK: Of the one you just read?

8 MS. KLEER: He was editor of this whole
9 routine, this Spruce Budworm, 1983 document.

10 MS. CRONK: Then I guess he's read it.

11 DEAN CARROW: I'm familiar with it, yes.

12 MS. KLEER: Okay. Well, I will get you a
13 copy afterwards and I refer to it then.

14 MADAM CHAIR: That would be exhibit --

15 MS. KLEER: Well, why don't we introduce
16 it later--

17 MADAM CHAIR: Do you want to wait?

18 MS. KLEER: --after we deal with the
19 questions.

20 MADAM CHAIR: All right.

21 MS. KLEER: Q. All right. Is it true
22 that B.t. products have recently become more
23 concentrated and that lower volumes are being applied;
24 is that a fair statement as to how B.t. is
25 operationally used?

1 DEAN CARROW: A. That's what I
2 understand, Ms. Kleer, yes.

3 Q. And would this cause a decrease in
4 the cost of application of B.t. as opposed to cost of
5 product?

6 A. Yes, that's right and, in general,
7 the lower volume you have to apply the lower the
8 application cost.

9 Q. And this is a positive development in
10 terms of cost effectiveness?

11 A. Yes, it is. Mm-hmm.

12 Q. Has the product cost of chemical
13 insecticides been increasing steadily since 1980; can
14 you answer that question?

15 A. You're referring to forestry--

16 Q. Forestry chemical insecticides.

17 A. --insecticides. Again, Ms. Kleer, I
18 haven't been associated with operational programs
19 closely enough in recent years, but my general sense is
20 that they are increasing on the unit basis.

21 Q. When you say unit basis, what do you
22 mean?

23 A. Well, per kilogram or per BIU, if you
24 want, if you're talking about B.t.

25 Q. But we are just talking here about

1 chemicals now.

2 A. Yes, right.

3 Q. Would you agree that research is
4 being done to improve the effectiveness of B.t.? Is it
5 being done at this point in time?

6 A. Yes, I believe it is.

7 Q. And could you elaborate on what types
8 of research are being done?

9 A. Well, I think generally the bulk of
10 the research on B.t. has historically been done by
11 Forestry Canada at the Forest Pest Management Institute
12 in Sault Ste. Marie and I believe that's still the
13 case. They have for many decades maintained a research
14 team that has been directed to B.t. research starting
15 back as early as the 1950s as a matter of fact.

16 The more recent research, as I understand
17 it, is concentrated on what we might call
18 identification of strains of B.t. which are more
19 virulent or more effective against particular target
20 pests, spruce budworm being one of them; the feeling
21 being that older strains of B.t. were initially
22 isolated and identified for effectiveness against
23 agricultural pests and that they were simply used in an
24 experimental way against forest pests and attempts were
25 made to improve the formulations and the delivery to

1 enhance the effectiveness.

2 In recent times researchers have
3 recognized that there are of course a large number of
4 strains of B.t. out there and, in fact, there may well
5 be strains that are inherently more virulent or more
6 effective against spruce budworm, and they have
7 found -- they have identified those strains, and my
8 understanding is that the commercial producers of the
9 products have incorporated those strains into their
10 products.

11 The other research, of course, has been
12 directed towards the development of more concentrated
13 formulations, more potent formulations so that less
14 material is required per hectare to achieve the same
15 effect and, of course, that results in a lower delivery
16 cost, lower volume delivered per hectare and it's also
17 resulted in some formulations which can be applied
18 without any dilution whatsoever, so that there is no
19 carrier or solvent involved in the formulation.

20 Q. Is research also being done to make
21 it less sensitive to deactivation by sunlight; is that
22 another research area?

23 A. It has been in the past, Ms. Kleer,
24 although I admit I'm not completely current on what's
25 gone on in recent years with that, but there has been

1 research done to identify particular additives that
2 could be put into the formulation to screen out
3 ultraviolet radiation, for example.

4 Q. And also has there been work done to
5 increase resistance to washoff by rain?

6 A. Yes, there has been some research on
7 those types of additives as well. Interestingly, the
8 more recent research on B.t., not just in Canada but
9 certainly elsewhere, has focused very heavily on the
10 toxic crystal which is generally regarded as being the
11 toxic component of the formulation, and it is a protein
12 crystal and I know there are a number of research
13 programs underway to try to come up with technology to
14 propagate or produce that crystal as the toxic agent,
15 if you want, quite apart from the bacterial spore.

16 So that -- in fact in my earlier evidence
17 I was asked about biochemicals and this is one of those
18 areas where, for example, the toxic crystal in B.t. is
19 in fact a biochemical and the research that is going on
20 in that area is quite exciting. I can't really predict
21 how successful they'll be, but it's certainly an
22 exciting new approach.

23 Q. Generally speaking, you've talked
24 about a number of research areas. In your opinion, is
25 this research actually resulting in improved

1 effectiveness of B.t. in achieving foliage protection?

2 A. It's my belief that it's resulted in
3 formulations which are more potent against the insect;
4 in other words, does a better job of killing the target
5 insect. Whether it results in improved foliage
6 protection is largely an operational consideration as
7 to how the material is put on and the timing and so on.

8 Q. Is there research being done of which
9 you're aware relating to improving the application so
10 that the problems that one has with B.t. don't occur
11 when you're applying it?

12 A. What do you mean by -- by what do you
13 mean particularly by application problems, I'm not sure
14 what you mean?

15 Q. Well, you were just talking about
16 there has been improved potency of formulations.

17 A. Mm-hmm.

18 Q. But then you went on to say that you
19 had to look at the operational considerations to
20 determine whether or not you were having or achieving
21 improved foliage protection. Has research been done or
22 is research being done to improve those operational
23 characteristics so that you get improved foliage
24 protection?

25 A. Well, I know that there is research

1 going on with respect to what they call spray
2 formulation research and largely that research is
3 trying to deal with the challenge presented by these
4 more potent formulations which tend to be extremely
5 viscous, they are very, very concentrated materials.

6 They can't be delivered with standard
7 hydraulic plumbing systems and standard delivery
8 systems, so there have had to be some modifications in
9 equipment design and equipment operation in order to
10 deliver those materials.

11 Q. Is it true that the formulation --
12 sorry, the strain of B.t. that is used primarily at
13 this time is kurstaki, or k-u-r-s-t-a-k-i?

14 A. Kurstaki.

15 Q. Kurstaki?

16 A. That's right.

17 Q. But there are many other strains of
18 B.t. that exist; is that true?

19 A. Well, there undoubtedly are many
20 others in nature, Ms. Kleer, but there are a number of
21 others that have been identified and propagated
22 commercially and now are available as commercial
23 formulations, and I'm thinking particularly of the one
24 that is used for control of biting flies, mosquitoes
25 and black flies, and it's a completely separate strain

1 of course which is not effective against lepidopterous
2 insects.

3 Q. Are there other strains of B.t. which
4 are effective or which are being investigated for their
5 effectiveness against other forest insect pests other
6 than spruce budworm?

7 A. I'm aware of one other strain which
8 is being investigated for bark beetles and my
9 understanding is that there has been a strain
10 identified that's effective against some beetles, some
11 members of the beetle family.

12 Q. And bark beetles are a pest within
13 the area of the undertaking?

14 A. They're a pest, they're not a major
15 pest.

16 Q. Just for clarification, bark beetles
17 are not the same as sawyer beetles; is that true?

18 A. They are both members of coleoptera,
19 they are both beetles, they have quite different
20 morphology generally and they have different feeding
21 behaviour.

22 Q. I would like to look a bit at the
23 long-term effects of B.t. Are you familiar with any
24 studies which have concluded, or suggested rather that
25 B.t. may have a long-term suppressive effect in

1 populations of spruce budworm?

2 A. I'm familiar with some work done a
3 number of years ago by Dr. Smirnoff in Quebec and then
4 I notice also a paper that you gave me to review by
5 John Dimond which is dated 1981 in which attempts were
6 made to document whether there is a carryover effect
7 from one year to the next on spruce budworm.

8 Q. Well, why don't we look at that
9 Dimond and Spies paper at this point.

10 MS. KLEER: And I would like to introduce
11 this as an exhibit. (handed)

12 MADAM CHAIR: Thank you.

13 MS. KLEER: Q. If we can look at the
14 first paragraph --

15 MADAM CHAIR: Excuse me. This will be
16 Exhibit 1207.

17 MS. KLEER: Sorry.

18 MADAM CHAIR: And what is the year of the
19 article?

20 MS. KLEER: It's 1981. And the article
21 is entitled: Two-Year Effects of Bacillus Thuringiensis
22 Treatment On Spruce Budworm, Choristoneura Fumiferana -
23 and you can read that for yourself - (Lepidoptera:
24 Tortricidae) -- how do you say it, tortricidae?

25 DEAN CARROW: Tortricidae.

1 MS. KLEER: Tortricidae. I was close.

2 ---EXHIBIT NO. 1207: Article entitled: Two-Year
3 Effects of Bacillus Thuringiensis
4 Treatment On Spruce Budworm,
5 Choristoneura fumiferana
(Lepidoptera: Tortricidae) by
Dimond and Spies, 1981.

6 MS. KLEER: Q. Now, in this first
7 paragraph does the author -- or do the authors
8 summarize four papers which reported observed multiyear
9 benefits or carryover effects of single treatments of
10 B.t.?

11 DEAN CARROW: A. I'm not sure whether it
12 specifies single treatments there, Ms. Kleer, but
13 anyway in general there are four papers that do report
14 the possibility of carryover.

15 Q. Did Dimond and Spies in this
16 particular study find that percentage defoliation in
17 the year following treatment; i.e., in 1980, was
18 significantly lower as compared to the check plots, and
19 perhaps we can look at Table 1 to confirm that.

20 A. Well, I think it's quite a dramatic
21 difference between the check plots and the treated
22 plots obviously in the year -- well, in 1979 to 1980
23 where, in the sense that the check plots received 100
24 per cent defoliation in both years; whereas there was
25 considerably less defoliation on many of the plots in

1 year two and in year one as well.

2 Q. Does this study constitute an example
3 of multi-year benefits of B.t. sprayed in one year --
4 sprayed in the year prior to the -- let me rephrase
5 that.

6 Is this study an example of the
7 multi-year benefits of B.t. if B.t. is sprayed in only
8 one year?

9 A. It's used to support that hypothesis,
10 Ms. Kleer, and I think there have been suggestions made
11 by others as well that perhaps that's a potential for
12 operational use of B.t., that is, that it would not
13 necessarily have to be reapplied every year.

14 MS. KLEER: At this point I'd like to
15 introduce a second paper which you have also looked at,
16 and this is a 1977 study by O.N. Morris. (handed)

17 MADAM CHAIR: Thank you.

18 That will be Exhibit 1208. You do such a
19 good job of this, Ms. Kleer, why don't read this to us.

20 MS. KLEER: Shall I read it?

21 MADAM CHAIR: Sure.

22 MS. KLEER: It's called: Long Term Study
23 of the Effectiveness of Aerial Application of Bacillus
24 Thuringiensis - Acephate Combinations against the
25 Spruce Budworm -- and you can read on.

1 ---EXHIBIT NO. 1208: Article entitled: Long Term
2 Study of the Effectiveness of
3 Aerial Application of Bacillus
4 Thuringiensis - Acephate
5 Combinations against the Spruce
6 Budworm, Choristoneura fumiferana
7 (Lepidoptera: Tortricidae) by
8 O.N. Morris, 1977.

6 MS. KLEER: Q. If we can turn to page
7 1248 in this paper, and if you look at the last
8 sentence in the first full paragraph it says that:

9 "The fact that population declines were
10 greater and defoliation and oviposition
11 were lower in the treated than in the
12 untreated plots in the second and third
13 years indicate a long-lasting effect of
14 bacillus thuringiensis treatments."

15 Does this study - which you I hope have
16 had an opportunity to review - support that conclusion,
17 Dean Carrow?

18 DEAN CARROW: A. Yes, I would say it
19 does support that conclusion, in the sense that it
20 gives an indication -- a clear indication of the
21 long-lasting effect, a multiyear effect of B.t.
22 treatments.

23 Q. So in your opinion is there
24 sufficient scientific support to conclude that B.t.
25 treatments may have long-lasting effects?

1 A. Well, certainly if you put it in
2 terms of 'may have', I would agree with that qualified
3 type of statement, Ms. Kleer.

4 It's interesting that a lot of this work
5 actually was -- this particular paper, for example, was
6 reported in 1977 and there was substantial interest in
7 that particular tactic of using B.t. perhaps on an
8 intermittent basis in the late 70s and early 80s, and I
9 would also point out that this particular paper raises
10 the possibility of using B.t. in combination with very
11 low levels of chemical insecticide in the same mixture,
12 it points particularly to the use of 10 per cent
13 recommended dosage of Orthene along with B.t. getting
14 some very good results.

15 And for whatever reason that particular
16 research does not seem to have been continued, and if I
17 had to conjecture on that I would say that probably it
18 was because in the early 1980s the quality of B.t.
19 formulations themselves increased very substantially
20 and the price dropped and research took perhaps a
21 different shift.

22 Nevertheless, my understanding is that
23 it's still -- the use of B.t. as a material that could
24 possibly have carryover effects is still a good area
25 for research.

1 MADAM CHAIR: And Dean Carrow do you
2 believe that using B.t. alone, or do you see that
3 primarily in combination with also other chemicals?

4 DEAN CARROW: Well, it's interesting,
5 Madam Chair, again that this was done in the late 70s
6 when B.t. formulations were not as effective, so there
7 was -- taking those particular formulations that were
8 available then and adding a small amount of Orthene
9 enhanced their effectiveness, I think Dr. Morris says
10 by about 34 per cent in his particular case.

11 MADAM CHAIR: Did they use just a pure
12 mixture of B.t. anywhere, or was it always in
13 combination with Orthene?

14 DEAN CARROW: No, I think there was -- he
15 had B.t. formulations put on alone for comparison as
16 well and I am not sure, Madam Chair, whether that same
17 type of research has as much potential now or not
18 because B.t. formulations are more effective, they're
19 more potent; however it may be, for example, that it
20 might be a good thing to look at with respect to
21 spruce, enhancing the effectiveness against spruce.

22 MR. MARTEL: If there are long-term
23 benefits based on programs, for example, in New
24 Brunswick which you say are ongoing, why would -- I
25 think you said there were no continuing studies of this

1 nature to your knowledge on the long-term effects?

2 DEAN CARROW: Of B.t.?

3 MR. MARTEL: Yes. Maybe I misunderstood
4 you.

5 DEAN CARROW: No, you're right, Mr.
6 Martel, there really -- I really can't tell you why
7 that particular research interest more or less
8 disappeared and quite often, quite frankly, it relates
9 to an individual who is interested.

10 Dr. Morris left forestry in the 80s and
11 moved into the agricultural field and his departure may
12 have more or less shut down that type of research, no
13 one else picked that up.

14 But I think you're correct, there hasn't
15 been a continuing sustained effort to try to
16 demonstrate the possibilities for using B.t. on an
17 intermittent basis rather than an annual basis.

18 MS. KLEER: At this point I'd like to
19 introduce another paper or excerpt from a paper.

20 MADAM CHAIR: When will it be convenient
21 to break for lunch, Ms. Kleer?

22 MS. KLEER: This is on the same topic.
23 After I've finished with this. (handed)

24 MADAM CHAIR: Exhibit 1209.

25 ---EXHIBIT NO. 1209: Excerpt from a paper entitled:

1 Microbial Insecticides in Canada:
2 Their Registration and Use in
3 Agriculture, Forestry and Public
4 and Animal Health, prepared by
Special Committee of the Science
Policy Committee, Entomological
Society of Canada, June, 1986.

5 MADAM CHAIR: Do you have another copy of
6 the Morris paper?

7 MS. KLEER: Yes, I do. (handed)

8 MADAM CHAIR: Thank you.

9 MS. KLEER: Could I have the exhibit
10 number of that again?

11 MADAM CHAIR: 1209.

12 MS. KLEER: If we can turn to page 146 of
13 that exhibit.

14 Oh, yes, for the record, the title of
15 Exhibit 1209 is: Microbial Insecticides in Canada:
16 Their Registration and Use in Agriculture, Forestry and
17 Public and Animal Health, and it's prepared by the
18 Special Committee of the Science Policy Committee,
19 Entomological Society of Canada, June, 1986.

20 Q. If we turn to page 14, which gives a
21 list of research and development needs in forestry,
22 looking just at Item 3, we've been talking about this
23 long-term effects information, and I would like to
24 focus on the last sentence in paragraph 3 which reads:

25 "If such a phenomenon can be confirmed by

1 further research, the full cost benefit
2 of B.t. applications in forestry and
3 agriculture may be more fully
4 appreciated."

5 Dean Carrow, do you agree that if B.t.
6 does have a long-term effect that there may be greater
7 benefit to the use of B.t. than we typically think
8 given that most data only looks at percentage
9 protection in the year of treatment?

10 DEAN CARROW: A. Yes, I would agree with
11 that as a generalization, Ms. Kleer. I guess with the
12 qualification that we really haven't looked
13 systematically at the long-term effects of other forms
14 of insecticide as well.

15 In fact, there is no reason to think that
16 sublethal doses of a chemical, for example, may not
17 have continuing effects on the population, continuing
18 adverse effects as well, but I think it is a good area
19 for research, particularly with respect to B.t.

20 Q. On that point, with respect to
21 chemical insecticides, would you expect that there
22 would be a growing resistance to chemical insecticides
23 over time as compared to biological insecticides?

24 MS. CRONK: Sorry, by whom? Do you mean
25 by the insects?

1 MS. KLEER: Sorry, my question was --
2 yes, resistance by the insects who are affected by
3 these insecticides. What else would it be?

4 MS. CRONK: I just wanted to be sure.

5 MS. KLEER: Okay.

6 DEAN CARROW: I don't -- you're talking
7 specifically about the potential for resistance to
8 insecticides--

9 MS. KLEER: Q. Yes.

10 DEAN CARROW: A. --part of the budworm
11 population.

12 Q. And I would like to have you compare
13 that between chemicals and biologicals.

14 A. From a purely scientific standpoint,
15 it's difficult I think to build an argument that says
16 that there is less potential for resistance developing
17 in B.t. than with chemical.

18 The reason being that the way in which
19 that resistance mechanism operates or develops is that
20 regardless of what control agent is put on against an
21 insect population, usually a certain percentage of that
22 population in fact survives the toxic dose. Some of it
23 of course -- some of them are not exposed, but given
24 that a certain percentage of that population is exposed
25 to the toxic agent, be it B.t. or chemical, ingests it

1 or absorbs it through the skin and survives it, there
2 is a good possibility that there is a genetic basis for
3 that particular survival. In fact, they've got
4 something that's genetically dictated there, either
5 physiologically or biochemically that makes them able
6 to withstand that.

7 Those survivors, of course, go on to the
8 next generation and they form the genetic base for the
9 next generation of insects, and I see little reason why
10 B.t. would not impact in exactly the same way on an
11 insect population as a chemical, such as matacil, would
12 impact.

13 Q. But isn't it true that if you look at
14 the long-term, that B.t., being an animal as opposed to
15 a chemical, will also evolve and develop
16 characteristics that a chemical -- a chemical is a
17 chemical is a chemical and it doesn't change over time
18 unless you change the formulation, but if B.t. will
19 also evolve over time, isn't it fair to say that you
20 would expect in the long term that B.t. could also
21 evolve so as to counteract any resistance that was
22 developing in the insect population?

23 A. The B.t.k, specifically kurstaki,
24 that is commercially formulated, we hope is not
25 evolving too much that would give the regulatory

1 authorities some real cause for concern.

2 In fact, one of the primary arguments of
3 the formulators has been that in fact it's a static
4 organism and that we operate on the assumption that the
5 microbe itself is not evolving, it produces a protein
6 crystal, which I mentioned earlier, which certainly is
7 not evolving, that is a standard chemical composition,
8 so that the stress on the insect from one year to the
9 next, if you want, should be virtually the same.

10 In nature, I would agree, Ms. Kleer, that
11 B.t. probably is evolving in nature under natural
12 circumstance, but not within the context of
13 commercially produced products.

14 Q. I agree agree with that, but you
15 could -- presumably if resistance were to develop at a
16 later point in time, you could select B.t. for
17 characteristics where it had shown that it was meeting
18 the developing resistance in the insect populations?

19 A. Well, certainly if we accept the
20 whole new thrust in biotechnology as a society, then
21 there are a lot of opportunities for genetic
22 improvement, as well as genetic engineering.

23 I might point out, because I wouldn't
24 want to leave the impression with the Board that this
25 is a problem, that there has been absolutely no

1 evidence whatsoever that forest insects are developing
2 resistance to pesticides that have been used. So it's
3 not at all the same phenomenon that's observed in
4 agriculture.

5 Q. Is that perhaps because the study
6 period has not been extensive or...

7 A. I think it has been extensive enough.
8 Agricultural scientists will, I think, tell you
9 generally that within 20 generations of an insect being
10 exposed to a particular pesticide there should be
11 evidence of resistance building up in that population.

12 We've had nearly 40 years of spraying of
13 spruce budworm, granted using different chemicals, but
14 that's part of the strength of the approach, I think,
15 is not to rely on one particular material, and there
16 has been no evidence off of that.

17 I think primarily it is because in any
18 given year the proportion of the epidemic that is
19 actually treated with an insecticide, be it B.t. or
20 chemical, is really relatively small, relative to the
21 entire population that covers eastern North America.

22 We are talking -- I think in my oral
23 evidence I mentioned that in the peak year back in the
24 mid 70s I think either 10 or 11 per cent of the
25 epidemic was sprayed and that was a peak year.

1 Generally it is only a very small percentage of the
2 epidemic that gets sprayed. So only a small protion of
3 it is actually exposed to that insecticide and,
4 therefore, there is a limited opportunity for
5 resistance.

6 Q. All right. Can we look for a moment
7 back at page 14, paragraph 3 of Exhibit 1209, and I am
8 referring to the study by Smirnoff 1938. I will just
9 read the summary there:

10 "Smirnoff (1983) demonstrated that a B.t.
11 treatment on spruce budworm in Quebec had
12 a debilitating effect on survivors.
13 Survivors of chemical insecticide
14 treatments were more vigorous and had
15 greater energy reserves than B.t.-treated
16 survivors or untreated populations."

17 Now, are you familiar with this Smirnoff
18 1983 paper which is entitled Residual Effects of
19 Bacillus Thuringiensis and Chemical Insecticide
20 Treatments on Spruce Budworm, and it was published in a
21 journal called Crop Protection?

22 A. I don't believe I have ever read that
23 particular paper, Ms. Kleer, although I was familiar
24 with Dr. Smirnoff's work generally because he is
25 reported on it in other forms.

1 Q. All right. Well, then, let me ask
2 you generally. You had said earlier that there was no
3 evidence of developing resistance to chemical
4 insecticides. Now, when I read that statement there
5 that:

6 "...survivors of chemical insecticide
7 treatments were more vigorous and had
8 greater energy reserves than both
9 B.t.-treated survivors or untreated
10 populations..." that suggests to me that
11 there is some level of increased resistance to chemical
12 insecticide treatments, and I would ask if that
13 statement indicates the same to you?

14 A. No, it doesn't at all. Dr.
15 Smirnoff's work, as I recall, and again I have to
16 apologize because I haven't read that paper
17 particularly, but as I recall, the line of that
18 particular research Dr. Smirnoff was using a particular
19 biochemical indicator, an enzyme indicator within the
20 spruce budworm as an indicator of vigor. And I know
21 from having attended scientific meetings that there was
22 considerable debate over the merits of that particular
23 approach and, to the best of my knowledge, that
24 research has not been continued.

25 Q. In your opinion, if long-term

1 effectiveness of B.t. applications were to be further
2 explored and it was found in fact to be so that there
3 were long-term effects of B.t., would you say that that
4 long-term effectiveness of B.t. applications versus
5 chemical insecticide applications, having a shorter
6 term effect, if that is so, would that be an important
7 consideration in your view in making policy decisions
8 as to whether or not you should limit yourself to B.t.
9 versus chemical insecticides and B.t.?

10 A. I think it's an approach, Ms. Kleer,
11 that has some merit with respect to particular types of
12 situations, and I am thinking here particularly of
13 commercial forests, commercially operable forests, that
14 again are part of the 20-year management plan cycle
15 and, in fact, are scheduled for the harvesting.

16 There is a possibility, and I would
17 emphasis it is only a possibility, that those forests
18 in fact could be protected with an intermittent
19 application of a material like B.t. rather than
20 necessarily an annual spraying program.

21 However, there are whole classes of
22 stands and forests where that particular tactic would
23 really be inappropriate, and I am thinking particularly
24 about high value stands, seed production areas,
25 research areas, high value plantations, where growth

1 and yield was really important and I am also thinking
2 of the major pest that we shouldn't forget, that
3 resource managers have to deal with in this province,
4 called forest tent caterpillar which is not a problem
5 with respect to timber management, but it's a major
6 public nuisance problem and in fact it is routinely
7 sprayed on an annual basis, just in order to make
8 recreational areas more attractive and acceptable
9 during outbreak periods.

10 So I guess what I'm saying in summary is
11 that it is a tactic that has certainly some potential
12 in certain circumstances.

13 Q. Just for -- the last point for
14 clarification. You said it would be a tactic with some
15 potential for commercially operable forests that are
16 operable -- that are planned for in the 20-year plan,
17 but then you talked about high value stands. What do
18 you mean by value stands as opposed to commercially
19 operable forests?

20 A. Well, I think high value stands --
21 and I would have to be corrected by my colleagues if I
22 misinterpreted this, but the Ministry uses that
23 terminology to refer to stands where there is a
24 particularly high value attached to them, either in
25 terms of a product or use pattern, parks, for example,

1 come to mind, young plantations where there has been
2 heavy investment in the establishment of those
3 plantation, seed orchards where there has been heavy
4 investment in the establishment of genetically improved
5 or superior strains of trees, just as a few -- just as
6 an example of some of the types of stands.

7 MR. FREIDIN: Madam Chair, for your
8 information, those forests are defined on page 151 and
9 152 of Exhibit 604A which was the witness statement for
10 Panel 13, Volume I.

11 MS. KLEER: Thank you.

12 MADAM CHAIR: Exhibit 614A?

13 MR. FREIDIN: 604A.

14 MADAM CHAIR: 604A.

15 MS. KLEER: All right. This would be an
16 appropriate time for a break.

17 MADAM CHAIR: All right. How long will
18 you be this afternoon, Ms. Kleer?

19 MS. KLEER: I would hope not more than
20 two hours.

21 MADAM CHAIR: We will have lunch now and
22 the Board will be back at ten to two.

23 ---Luncheon recess taken at 12:20 p.m.

24 ---On resuming at 1:55 p.m.

25 MADAM CHAIR: Please be seated.

1 Ms. Kleer?

2 MS. KLEER: As I know you don't want to
3 be here Friday night, if at all possible, I have
4 decided that we don't have to look further at the study
5 that we talked about earlier, the B.t. and the 1983
6 report.

7 MADAM CHAIR: We didn't make that an
8 exhibit anyway.

9 MS. KLEER: No.

10 Q. Okay. If we could turn to Table 12,
11 page 173, which is the table entitled Major Forest
12 Insect Pests in the area of the undertaking, and then
13 also we will be looking at 174 as well.

14 Dean Carrow, it's your evidence, is it
15 not, that of the major pests in the area of the
16 undertaking, which you have indicated here in Table 12,
17 there are 12 pests for which no control agents are
18 available; is that correct?

19 I believe your evidence on page 174
20 refers to 11 major forest pests, but it was
21 subsequently revised to say 12 major forest pests?

22 DEAN CARROW: A. Yes, that's correct and
23 they are 12 for which there is no available biological
24 control.

25 Q. Okay.

1 A. In other words, under the current
2 provincial policy of no chemicals, there is no control
3 available for 12 of those 15 pests listed.

4 Q. Now, you have reviewed, I take it,
5 Mr. Churcher's evidence given in Panels 12 and 13?

6 A. Yes, I have.

7 Q. Now, I can refer to the page
8 reference, if you wish, but perhaps you can just do
9 that without looking at it.

10 I believe it was his evidence that there
11 were only four major insect pests of concern within the
12 area of the undertaking and those were spruce budworm,
13 jack pine budworm, gypsy moth and forest tent
14 caterpillar; is that correct? Is that your
15 recollection of his evidence?

16 A. I'm sorry, I would have to reread the
17 transcript to clarify that.

18 Q. Okay. Can we refer then to Volume
19 110 of the transcript, page 18,349. Do you have it
20 there? I can provide it to you, if you wish.

21 MADAM CHAIR: Does the Board need this
22 transcript, Ms. Kleer?

23 MS. KLEER: You may want to refer to it.
24 I had asked Michele Devaul but I guess -- it's not
25 there?

1 MADAM CHAIR: Well, it could be.

2 MS. KLEER: Well, the only reason I am
3 doing it is for him to confirm what the evidence stated
4 and if he does that perhaps you don't need to refer to
5 it.

6 Q. I reviewed pages 18,349 to 18,356 in
7 coming up with that list of four major pests. So I
8 would ask -- I would believe that that statement was
9 probably made at 18,349, about the four major pests.

10 DEAN CARROW: A. The words that I see
11 here, Ms. Kleer, that deal with that are "four insects
12 of current concern".

13 Q. Okay.

14 A. That's the exact language that's
15 used.

16 Q. All right.

17 MADAM CHAIR: This is whose evidence?

18 MS. KLEER: Mr. Churcher's evidence.

19 MADAM CHAIR: Thank you.

20 MS. KLEER: Q. And what page reference
21 is that, for the Board's information?

22 DEAN CARROW: A. That's 18,349.

23 MADAM CHAIR: Thank you.

24 MS. KLEER: Q. Now, of those four
25 insects of current concern, three of them; namely,

1 spruce budworm, jack pine budworm and forest tent
2 caterpillar, have registered for use against them B.t.;
3 is that correct?

4 DEAN CARROW: A. Yes, that's correct.

5 Q. Now, in your evidence, Table 12,
6 showing the major forest insect pests, you did not
7 include the gypsy moth as being what you would term a
8 major pest.

9 A. No, I didn't.

10 Q. Could you explain why?

11 A. Yes, because specifically Table 12 is
12 an extract from the Annual Report of the Forest Insect
13 and Disease Survey by Great Lakes Forestry Centre,
14 1987, dated in 1987.

15 And the table that's headed, Major Forest
16 Insect Pests in the Area of the Undertaking, gypsy moth
17 in 1987 was not considered a major insect pest in the
18 area of the undertaking and so I deliberately did not
19 include that particular pest on this list. However, I
20 have given in oral evidence since that time an
21 indication that gypsy moth has moved into the southern
22 part of the area of the undertaking in the latter part
23 of the 1980s.

24 Q. All right. Just to look briefly at
25 your evidence on gypsy moth at page 171 your statement.

1 Just to summarize, is it true that MNR did not use
2 B.t.k. until '86 and 1987 against the gypsy moth?

3 A. It was used in 1982. In fact, there
4 are 263 hectares sprayed in that particular year, but
5 that was a very small portion of the overall
6 infestation, but you are correct in a general that it
7 was not used in an operational sense until 19 -- really
8 until 1986 on a large scale.

9 Q. Now, is it also true that in 1986 the
10 outbreak had reached a severe level?

11 A. It reached its peak in 1985 and in
12 1986 it was certainly still very widespread.

13 Q. Do you have any basis to conclude
14 that had chemicals been used in '86 and '87 that you
15 would have achieved a higher success rate against the
16 gypsy moth in terms of controlling it?

17 A. As our evidence indicates, Ms. Kleer,
18 I don't think that -- and I think I tried to make that
19 point very strongly, that by the time the epidemic had
20 expanded to those proportions in '85 and '86, in fact
21 the opportunity for controlling that outbreak had
22 essentially been lost regardless of what material you
23 are using.

24 The purpose of the programs in those
25 years since 1985 I believe has been protection of

1 foliage.

2 Q. Were you using this particular
3 example to suggest that it was the no-chemicals policy
4 which caused this situation to arise; i.e., that gypsy
5 moth had basically gone out of control?

6 A. There were two factors here. One was
7 that at that particular time in 1982 the Ministry had
8 in place an internal policy that dealt with -- or
9 certainly still deals with the aerial application of
10 insecticides for use against forest pests, and one of
11 the three purposes of aerial spraying -- in fact the
12 first purpose of aerial spraying was to bring
13 developing epidemics or outbreaks under control,
14 referred to commonly as outbreak control.

15 That opportunity for outbreak control
16 existed in 1982. It was lost because that particular
17 tactic or strategy was not followed at that particular
18 point in time, regardless of which material was used,
19 and in fact it expanded into the problem that was much
20 more severe and much more widespread.

21 I might say that in 1982 one of the major
22 factors that contributed to that decision, of course,
23 was the proposal to use -- the commonly used registered
24 insecticide which was sevin. At the particular time
25 when the decision was made, B.t. was not even

1 registered for use against gypsy moth. So the
2 pesticide of choice, if you want, from year to year was
3 sevin, particularly to bring outbreaks under control.

4 Q. Is it fair to say that had B.t. been
5 available at that time as a formulation registered
6 against the gypsy moth and had it been used at a large
7 enough scale that this outbreak that occurred -- well,
8 that peaked in '85 and then continued on, might have
9 been controlled or can you make that statement?

10 A. That's quite a big leap of faith,
11 largely because in 1982 the efficacy of B.t. against
12 gypsy moth was really still very questionable, and I
13 say that on the basis of use in the United States, as
14 well as some very preliminary testing in Canada, but
15 primarily based on the U.S. experience. The efficacy
16 of B.t. to bring an outbreak under control; that is, to
17 achieve very high levels of population reduction, was
18 really quite questionable, also bearing in mind that in
19 1982 the formulations of B.t. were not as potent as
20 they are now. So we are dealing with a different
21 product.

22 Q. If the same -- well, just to clarify.
23 At present, B.t. can be used against gypsy moth; is
24 that correct?

25 A. Yes, that's correct. It's registered

1 for use.

2 Q. All right. So with the current
3 no-chemicals policy, if another outbreak were seen to
4 be happening and they wished to achieve the first level
5 of control; namely, outbreak control, MNR would have
6 available to it B.t.; is that correct?

7 A. Under the current policy, that's
8 right.

9 Q. So under the current policy, then, it
10 is possible that the same level of outbreak that
11 occurred in 1985, '86, '87 would not have happened if
12 B.t. had been used in the formulations that are now
13 presently available?

14 A. I couldn't support that at all, Ms.
15 Kleer, primarily because, to the best of my knowledge,
16 the use of even the current formulations of B.t. for
17 the express purpose of achieving population reduction
18 and outbreak control has not been demonstrated.

19 It has been used for foliage protection
20 and is being used for foliage protection, but, to the
21 best of my knowledge, it hasn't been verified that it
22 could bring an expanding outbreak under control; that
23 is, to achieve those levels of population reduction of
24 90 or 95 per cent which are necessary.

25 Q. But is foliage protection not a

1 desirable, if less desirable, but it is still a
2 desirable goal as compared to outbreak control?

3 A. In the overall context of pest
4 management, it's the last resort.

5 Again, in my oral evidence I think I
6 tried to convey to the Board the message that, in fact,
7 the gypsy moth situation represents, in my own personal
8 career, a once in a lifetime opportunity. The
9 opportunity to bring a new pest under control in the
10 very early stages simply occurs very, very rarely.
11 It's the first time I have seen that personally in my
12 own experience.

13 Q. Do you -- sorry.

14 Q. And so that particular tactic or
15 strategy was at the time, I think, a very valid
16 strategy and it was proposed on the basis that by
17 acting in 1982 we wouldn't have the problem we have now
18 in the late part of the 1980s and early 90s.

19 Q. But given the historical set of
20 events that occurred, we also don't have any evidence
21 to say at this point that sevin, had it been used at
22 that time, would have achieved outbreak -- what's the
23 first level of protection outbreak? Control?

24 A. Yes. No, I would disagree with you
25 on that. Again, in my evidence I pointed out that

1 sevin had been used historically by Agriculture
2 Canada's plant quarantine division to bring outbreaks
3 of gypsy moth under control in various locations across
4 Canada.

5 This insect probably is still regarded as
6 an introduced pest because it originated from Europe
7 and under the Plant Quarantine Act, Agriculture Canada
8 has responsibility for carrying out controls of
9 introduced pests. Up until -- well, they still do it
10 in Canada, but up until 1982 they had routinely treated
11 small pockets of gypsy moth across Canada with sevin to
12 achieve outbreak control, their level of success had
13 been very, very high.

14 Q. Had any of that been done in the area
15 of the undertaking or was that --

16 A. No, because the insect had not
17 expanded or not dispersed itself into the area of the
18 undertaking. It had been done throughout eastern
19 Ontario, throughout Quebec, Vancouver, locations such
20 as that.

21 Q. Is it fair to say that you can't make
22 a certain statement given that we haven't seen the same
23 setting; i.e., the area of the undertaking geographical
24 and climatic setting, that you don't really know that
25 within the area of the undertaking sevin would have had

1 the same effect?

2 You are basing your assumption -- sorry,
3 you're basing your conclusion on other jurisdictions
4 and the results of B.t. -- sorry, not B.t., of sevin in
5 other jurisdiction as used against gypsy moth?

6 A. Well, that's true. It would have
7 been very hard to demonstrate that in the area of the
8 undertaking since gypsy moth wasn't present in the area
9 of the undertaking.

10 Q. All right.

11 A. But it was present throughout the
12 northeastern United States, the Maritimes, southern
13 Quebec, southern Ontario, coastal British Columbia and
14 in all of those cases Agriculture Canada used sevin to
15 bring outbreaks under control and used it with a high
16 degree of success.

17 Q. Would you be able to tell me whether
18 or not the formulation of sevin which was used -- would
19 you be able to tell me what diluents were used with the
20 sevin that was used to achieve those levels of control?
21 Was it diluent 585 or was it some other carrier?

22 A. I would have to go back and try to
23 get that information from Agriculture Canada. It's
24 not -- I might say that information generally isn't
25 part of the public record.

1 I can tell you that during that time
2 period two formulations of Sevin were commonly used;
3 one was the Sevin-4 oil which was diluted in an oil
4 carrier and the other was the wettable powder and those
5 were the two common formulations used around that time.

6 Q. Was Sevin-4 oil more or less common
7 than the wettable powder or can you not give that?

8 A. I can't tell you that.

9 Q. You don't know that, all right. I
10 would like to look more closely at the major pests in
11 the area of the undertaking that you have shown in
12 Table 12 at page 173.

13 First of all, looking at the -- well,
14 before I get into that. Just for the sake of
15 clarification again, to have it before the Board, when
16 you use the word major how is that word used? In what
17 sense is that word used?

18 A. This is the exact word that is used
19 by the Forest Insect and Disease Survey of Forestry
20 Canada in their annual report, and my interpretation of
21 that is that by major they mean it is a pest that
22 causes moderate to severe damage on trees of value --
23 on tree species of value.

24 Q. That does not mean that it
25 necessarily is causing it currently, but it has the

1 potential to cause that?

2 A. In 1987 -- Table 12 refers to a
3 specific situation in 1987 in which all 15 of those
4 pests were causing or did cause major damage on those
5 trees, on those species.

6 Q. All right. Now, the black army
7 cutworm, it's true that it attacks seedlings; is that
8 correct?

9 A. Yes, that's correct.

10 Q. And could you give me an indication
11 of the size of a black army cutworm infestation? What
12 would be a typical area size?

13 A. What I would like to do, Ms. Kleer,
14 is defer to some of my industrial colleagues because
15 they've had direct experience with black army cutworm,
16 so I would have ask them to comment on that.

17 MR. TOMCHICK: A. In the evidence that I
18 gave earlier on, we indicated -- or I indicated that
19 incidents with black army cutworm, we noticed the
20 incidents on a sporadic basis initially; however, the
21 incidents is increasing and I can't comment on the
22 extent of each individual infestation, although the
23 number of incidents of infestation are increasing and I
24 attribute that mainly due to the increased level of
25 renewal we are doing in that there are more young jack

1 pine stands available for this insect to infest. I
2 can't comment on size of the infestations.

3 Q. Is it something that reaches outbreak
4 status quickly or is it something that can be
5 controlled prior to reaching outbreak status?

6 A. I don't know.

7 Q. Does anyone here on the panel know
8 that?

9 DEAN CARROW: A. I think I could just
10 comment from personal experience, Ms. Kleer, although
11 it isn't specific to the area of the undertaking, but
12 it is the same insect.

13 I have seen this insect in British
14 Columbia and I have seen examples of plantations that
15 are in the order of perhaps 80 hectares in which it's
16 very difficult to find a living seedling left. In that
17 particular situation, and I'm not sure whether it
18 applies to the area of the undertaking, the cutworm is
19 particularly severe after the area has been burned,
20 silviculturally burned in preparation for the planting.

21 So it's an area that's had prescribed
22 fire as a silvicultural treatment and that seems to
23 make that area much more susceptible to black army
24 cutworm attack and, as I say, I have seen instances of
25 virtually entire plantations destroyed within a very,

1 very short time period, and by that I mean within a
2 matter of a few weeks.

3 It's not unlike those of us who grow
4 tomatoes and find that when we put them in the ground
5 and come back a week later and there is no evidence of
6 them at all, we know that the cutworm has been there.

7 Q. Is it true that within the area of
8 the undertaking that adjusting the planting time of
9 seedlings to correspond with the pupal stage of the
10 black army cutworm has been effectively used to prevent
11 seedling mortality?

12 Are you familiar with that or is anyone
13 on the panel familiar with that?

14 MR. TOMCHICK: A. No.

15 Q. Perhaps I can refer to Volume 110,
16 page 18,367 and you have a copy of that before you.

17 MS. CRONK: 18,3...

18 MS. KLEER: 18,367.

19 MS. CRONK: Thank you.

20 MS. KLEER: Q. If you could review that
21 quickly. I don't know who is best suited to answering
22 the question, perhaps I will address my question to
23 Dean Carrow.

24 A. Yes, okay, I have read over Mr. -- I
25 believe it is Mr. Churcher's evidence.

1 Q. Were you familiar with this type of
2 control prior to reading that?

3 A. I was familiar with it as an
4 alternative, that's right.

5 Q. In your opinion, isn't that method;
6 i.e., adjusting the planting time of the seedlings, an
7 effective way of controlling the black army cutworm
8 which does not require the use of a control agent, a
9 biological or chemical control agent?

10 A. I could certainly agree that that
11 particular alternative has some promise. I wouldn't be
12 prepared to say that that's a universal solution for
13 all seedling species and all black army cutworm
14 situations.

15 Q. Dean Carrow, are you aware that the
16 Entomological Society of Canada has stated that the use
17 of the alfalfa looper NPV or nuclear polyhedrosis virus
18 merits further use for control of the black army
19 cutworm. I can refer you to the reference if you wish?

20 A. No, I'm not aware of that.

21 Q. Okay. If we could look at Exhibit
22 1209, page 14, and that's the Microbial Insecticides in
23 Canada paper.

24 A. Sorry, what page is that?

25 Q. Page 14.

1 A. Which section are you referring to.

2 Q. I am searching for that at the
3 moment. Yes, in paragraph 5, at the second last
4 sentence, it says:

5 "There are NPVs of balsam fir sawfly,
6 jack pine sawfly, red pine sawfly, and
7 eastern hemlock looper; also included in
8 this list is alfalfa looper NPV for
9 control of black army cutworm."

10 Then it goes on to say:

11 "Efficacy tests should be conducted so
12 that whitemarked tussock moth and rusty
13 tussock moth can be added to the Vertuss
14 label."

15 THE REPORTER: Excuse me, Ms Kleer.

16 MS. KLEER: It's at page 14, if you wish
17 I can read that into the record again.

18 THE REPORTER: Thank you.

19 MADAM CHAIR: Could you tell us again
20 what NPV stands for?

21 MS. KLEER: It's nuclear polyhedrosis,
22 that's p-o-l-y-h-e-d-r-o-s-i-s, virus.

23 And I will read that sentence again.

24 "There are NPVs of balsam fir sawfly,
25 jack pine sawfly, red pine sawfly and

1 eastern hemlock looper; also included
2 in this list is alfalfa looper NPV for
3 control of black army cutworm. Efficacy
4 tests should be conducted so that
5 whitemarked tussock moth and rusty
6 tussock moth can be added to the Vertuss
7 label."

8 Now, this, just to confirm then, Dean
9 Carrow, if you read that whole paragraph in context is
10 it not the case that the Entomological Society has
11 indicated that the black army cutworm could be or
12 should be -- the use of the alfalfa NVP should be
13 investigated for the black army cutworm?

14 DEAN CARROW: A. That's not what that
15 statement says, but, on the other hand, I wouldn't
16 disagree with that suggestion, Ms. Kleer. It says:
17 "There are NPVs of balsam fir sawfly..."
18 et cetera, "...also included in this list is alfalfa
19 looper NVP for control of black army
20 cutworm."

21 In other words, they have identified the
22 existence of the virus which has potential against
23 black army cutworm.

24 Q. All right. If I could just take you
25 back to the prior sentence, it says that -- after

1 listing NPVs that are currently available, it also
2 says:

3 "A few other viruses are at an early
4 stage of development and merit further
5 research to determine if they are
6 potentially useful microbial control
7 agents."

8 And that was the basis of my question.

9 A. I would certainly agree with that
10 statement.

11 Q. All right.

12 A. I would want to point out, though,
13 Ms. Kleer, as of 1990 that virus is not available for
14 use against black army cutworm. Its efficacy has not
15 been demonstrated and, more importantly, it is not
16 registered for use, nor is it commercially available.

17 Q. No, I appreciate that. If we can
18 look then at weevils, I would ask the same question and
19 perhaps again I would have to refer to the panel.

20 Could anyone indicate for me the size of
21 the outbreaks of weevils? Has anyone had experience
22 with that?

23 MR. BUNCE: A. I had experience with the
24 white pine weevil on jack pine plantations and it has
25 become fairly widespread throughout the FMAs that we

1 have, the Upper and Lower Spanish Forest, and I would
2 not consider it as epidemic proportions; however, we
3 have seen a higher incidence than we have noticed in
4 earlier years.

5 Q. Are you familiar with the length of
6 its cycle, an outbreak cycle for this particular
7 creature?

8 A. I would say no.

9 Q. Is there anyone else familiar with
10 that; in other words, is it something like spruce
11 budworm that keeps going and going and going?

12 MR. SMITH: A. I'm familiar with that
13 particular pest on the Spruce River Forest FMA where
14 we have done simultaneous Bracke seeding projects and
15 aerial seeding projects.

16 The pest, this is from aerial
17 observation, seems to establish itself on about 5 to 10
18 per cent of the trees. As opposed to spruce budworm
19 where every single tree may be infested, the weevil
20 moves around on a year to year basis and over a period
21 of five or six years, although it's not infesting, say,
22 90 to 95 per cent of the trees at any given point in
23 time, it may damage every tree over a period of a
24 longer time and, therefore, it is a very difficult
25 insect to control.

1 DEAN CARROW: A. It is not a strongly
2 cyclic pest in the context of forest tent caterpillar
3 or insects like that, Ms. Kleer.

4 Q. Would you say, then, that it is
5 something of less concern than the spruce budworm? Is
6 that a fair comment.

7 MR. SMITH: A. Depending on what your
8 priorities are. We have jack pine plantations where if
9 your No. 1 priority is lumber production; i.e., saw
10 logs, the weevil is capable of inflicting damage to the
11 point where essentially every tree in the plantation is
12 deformed.

13 If the priority -- in this particular
14 case, if this plantation is in relatively close
15 proximity to your manufacturing plants, I would -- you
16 know, on an equal basis in terms of magnitude, it's a
17 lot smaller, but on that particular land plantation it
18 is a major problem.

19 Q. So if you look across the area of the
20 undertaking, given that there are different goals,
21 would you say that the weevils are equally of concern
22 across the area of the undertaking or would it depend
23 upon what your goal is in terms of production?

24 A. I am only familiar with the weevil
25 situation in my particular area, which is the Spruce

1 River Forest FMA, and I am not in a position to
2 classify it over the area of the undertaking in that
3 context.

4 Q. Perhaps, Dean Carrow, since you have
5 a better understanding.

6 DEAN CARROW: A. I think I would defer
7 to Mr. Bunce who has a situation in which perhaps the
8 weevil is a little more significant as well.

9 Q. Before you do that, if I can just ask
10 you one more question, Mr. Smith. Can you think of
11 examples where the product that you were seeking to
12 harvest -- or produce, rather, you wouldn't be so
13 concerned about the weevil?

14 MR. SMITH: A. Okay. In the situation
15 that I am familiar with, which is primarily jack pine,
16 it is a major problem on a fairly significant portion
17 of our jack pine regeneration areas.

18 The majority of this renewal effort, and
19 it has been stated previous to this, is from about 1981
20 on. We are in a situation now in reviewing the
21 literature and looking at what we can expect 30 to 40
22 years down the road from this pest.

23 So, No. 1, I haven't harvested an area
24 that has had weevil damage over a period of time, so I
25 am not sure of the types of trees that we are going to

1 be creating, but I do know in some of our jack pine
2 renewal areas, sawlog production or producing sawlog
3 material is a priority and we feel that it will damage
4 some of those sawlogs.

5 Q. But this is your first experience
6 with the weevils; is that fair?

7 A. Exactly.

8 Q. Okay. Mr. Bunce?

9 MR. BUNCE: A. As I said, we've had an
10 increase in the weevil that we have noticed on our
11 young jack pine plantations and we brought that to the
12 attention of the Ministry. In fact, they already knew
13 about it. We talked with them about what we could do
14 to see if we could find out some methods for control of
15 those. I believe that there was some clipping that was
16 done in a small area to see what we can do in that and
17 bring in the tops.

18 In addition to that, we have assisted in
19 a research project with the University of Toronto in
20 which 40 or 50 trees - I think it was 40 trees - were
21 selected from certain areas, the research people
22 selected them. We had these mature trees harvested,
23 they were shipped to a sawmill, they were sawed into
24 lumber, the lumber was graded and the research people
25 are then going to try and determine if the grade was

1 less from the effect of weevil damage 40 years ago or
2 50 years ago.

3 Now, that research, as far as I know, is
4 still ongoing, but that's the point that we are at now.

5 Q. So at this point, then, it isn't
6 clear, no one knows whether or not the weevil will
7 affect the grade -- negatively affect the grade of the
8 jack pine?

9 A. That's correct; however, we are
10 sufficiently worried because we have young plantations
11 that we have invested considerable amounts of money
12 into to see if we could find out whether that will
13 actually effect the grade or not.

14 Q. Okay.

15 MR. TOMCHICK: A. If I might add, the
16 nature of our concern with regard to this pest is that
17 we don't have a control for it; whereas we do have
18 controls for the other -- some other major pests.

19 MR. SMITH: A. If I could also add to
20 that. We're participating co-operatively in the
21 Ontario Tree Improvement Program where we have
22 established family tests, and when I apply family
23 tests, we selected 400, in this case jack pine
24 individuals and from those individuals through a
25 roguing process and testing process--

1 Q. Sorry, through a what process?

2 A. Roguing.

3 Q. R-o-g-u-i-n-g; do you know?

4 A. Sounds close enough.

5 Q. Okay.

6 A. We've established a jack pine test
7 and from that material, by testing that material in
8 terms of growth, of form characteristics, performance
9 over a period of time we will pick individuals from
10 that test and plant them in an orchard and they will
11 produce improved seed for not only Abitibi-Price in
12 Thunder Bay area but the Ministry of Natural Resources.

13 And we had a weevil infestation in our
14 test and the problem with that is that it's interfering
15 with the genetic gain comparison; in other words, the
16 weevils in there are creating just formities, crooks
17 and that type of damage, and we are in the process of
18 trying to control that particular pest in our family
19 tests.

20 Q. And what control mechanisms, if any,
21 have you used?

22 A. Okay. We have tried three things;
23 one was the weevil overwinters underneath the tree as
24 opposed to being in the tree, so we attempted to remove
25 vegetation. One point I would like to make before I

1 carry on, this area is not in the area of the
2 undertaking but it is directly adjacent to the area of
3 the undertaking.

4 Q. North, south, west?

5 A. West.

6 Q. West.

7 A. West, by five miles.

8 Q. Is it comparable forest type?

9 A. Comparable forest type.

10 Q. Okay.

11 A. It's comparable. We have also
12 clipped the trees and that's -- the adult will lay eggs
13 and there is a period where they're vulnerable before
14 they vacate back to underneath the tree, that if you
15 clip the terminal you will indeed capture the host
16 pest. And we have also sprayed, in this case, ground
17 application for a product of methoxychlor and that was
18 done this past spring.

19 Q. This clipping that's been referred
20 to, that's a form of mechanical control; is that a fair
21 classification?

22 A. That's right.

23 Q. And have you done any analysis of how
24 effective that is, or could you tell me based upon your
25 experience how effective that clipping is in terms of

1 controlling the weevil?

2 A. Okay. Unfortunately, we won't be
3 able to make that determination until this July and
4 August. The clipping was done last August, the insect
5 damage would appear generally throughout the summer
6 months.

7 Q. Mr. Bunce, I think you referred as
8 well to clipping.

9 MR. BUNCE: A. Yes, I did.

10 Q. And have you seen the results of
11 that?

12 A. I can only comment in a general sense
13 on this, that I know they did the clipping and they did
14 it over a one-week period or whatever and, as I
15 understand, you have to clip them at the time when the
16 larvae are still in the need of coming down, so they
17 had clipped them two years ago. I understand that they
18 did make some test trees and control plots in there.
19 What the results are at this point, I don't know. The
20 clipping was done by the Ministry of Natural Resources
21 when the plots were set up.

22 Q. All right. Perhaps we could look for
23 a moment at Exhibit 632 Question No. 6 by OFIA/OLMA,
24 and that's a Panel 13 MNR Interrogatory.

25 MR. TOMCHICK: A. Question No. 6?

1 Q. Yes, Question No. 6 in Exhibit 632.

2 MR. FREIDIN: Do you have any extra
3 copies?

4 MS. KLEER: Do you have a copy of this in
5 front of you?

6 MR. TOMCHICK: I have one.

7 MR. BUNCE: No.

8 MS. KLEER: Q. I'm sorry. Does anyone
9 else on the panel have a copy? I'm going to direct my
10 question to Mr. Bunce, if I might.

11 DEAN CARROW: We have a copy here.

12 MR. SMITH: Pass that to Mr. Bunce.

13 MR. FREIDIN: There are no extra copies
14 of that?

15 MS. KLEER: No, I'm afraid not. I
16 referred to it yesterday.

17 Q. Now, it indicates there in that
18 answer to Question No. 6 that mechanical control - and
19 I'm looking at the third paragraph:

20 "Mechanical control such as leader
21 clipping for white pine weevil on both
22 white pine and jack pine did occur to
23 some degree in the area of the
24 undertaking in the last five years."

25 Now, I apologize, there is no indication

1 here -- and I'll ask this as a question: There is no
2 indication here either of the effectiveness of this
3 technique in this answer; would you agree?

4 MR. BUNCE: A. I would have to read the
5 whole answer to --

6 Q. If you could just briefly review it.

7 A. I don't see it in that paragraph, but
8 they have -- they did mention jack pine plantations in
9 the Gogama District to survey the trees for these tests
10 on jack pine in 1987 and '88 which is the area that I
11 was referring to, but I don't see any results here
12 either.

13 Q. All right. Perhaps I can just ask a
14 more general question and, Dean Carrow, I'll address
15 this to you.

16 Given your familiarity with the area of
17 the undertaking, can you say whether or not this is a
18 pest that is of great concern across the area of the
19 undertaking in terms of the area affected?

20 DEAN CARROW: A. The hectares affected?

21 Q. Yes.

22 A. Well, it's certainly not in the same
23 order of magnitude as spruce budworm, but that's the
24 type of thing you try and get at.

25 But again, I don't know what relevance

1 that has to an individual resource manager who has a
2 unit on which he or she may have several hundred or
3 thousand hectares of jack pine, for example, that's
4 infested by white pine weevil, that's a serious problem
5 in that situation, and I don't care what the provincial
6 total is, that person has to have some capability to
7 control the pest, and I think that's the dilemma faced
8 by managers.

9 And I might point out, Ms. Kleer, that
10 this pest of course has been around a long time, in
11 fact in my observation has been one of the major
12 contributing factors to managers at various locations
13 managing against white pine in the past because they
14 regard it as a very serious problem, particularly in
15 the early stages of tree development.

16 Once the tree gets to a certain height
17 it's really free of weevil, but in the early stages up
18 to oh, 20 feet, 20 or 25 feet in height it's a very
19 serious problem and the lack of effective control
20 technology has been a real havoc, a real obstacle.

21 Q. Is it fair to say though that this
22 leader clipping technique, for instance, is something
23 that is only recently being tested as a potential
24 control mechanism?

25 A. No, it's been around quite a long

1 time and in fact it's been -- it's well-documented in
2 the literature. If you look under white pine weevil
3 control you will see that referenced back several
4 decades and indeed it's been -- in my own experience,
5 it's been practised by forest managers and woodlot
6 managers throughout my career anyway.

7 I guess it makes quite a difference
8 depending on how many hectares of white pine you have.
9 I grow some myself and if I've got a white pine weevil
10 problem I handle it with a pair of pruning clippers,
11 obviously because I'm only dealing with a few hundred
12 trees; if I had to deal with a thousand hectares, it
13 would be quite a different matter, and I think that's
14 the distinction here.

15 Q. Well, if you put aside for the moment
16 the question of the manpower that it would take, would
17 you agree that leader clipping works in terms of
18 controlling the weevil?

19 A. It's quite an effective method, yes,
20 yes, it is; provided, as you may know, the leaders have
21 to be clipped off and that material has to be burned or
22 destroyed in some way because the insects are still
23 alive in there. So the idea is to remove that infested
24 leader and to destroy it.

25 Q. The same thing with apple trees?

1 A. Yes, that's right, sure.

2 Q. I'd like to look for a moment at the
3 larch sawfly and again I will ask the question: What
4 is the typical size in outbreak of larch sawfly;
5 can anyone on the panel answer that?

6 MR. TOMCHICK: A. I'm only familiar with
7 one outbreak of larch sawfly since I've been working
8 with the company on our three FMAs. I don't know the
9 exact extent of the outbreak, but it certainly wasn't
10 very big, the one that I was aware of, in that the
11 stand wasn't very big, the stand at large wasn't very
12 big.

13 Q. Can anyone speak more generally to
14 the question?

15 DEAN CARROW: A. I could address that in
16 more general terms, Ms. Kleer, and we did address that
17 partly in response to the Ministry of the Environment
18 interrogatory which was their Question No. 4 in which
19 they enquired about the use of insecticides in the area
20 of the undertaking against sawflies and as well as a
21 number of other insects, and in our response we
22 referred specifically to the larch sawfly as an
23 example.

24 It's an insect in Ontario which,
25 particularly in the area of the undertaking, which has

1 gone through outbreak -- very serious outbreak cycles
2 in the 1980 -- sorry, in the 1880s, the 1920s, the late
3 1950s and the late 1960s, so that in this century there
4 have been three serious outbreaks of that particular
5 pest in larch forests.

6 It's well-documented that historically
7 that particular pest was largely responsible for the
8 destruction of that species throughout northern
9 Ontario, and at the time spray programs were not
10 carried out because at the time the commercial value of
11 tamarac as it was known was limited.

12 However, in the meantime, there have been
13 some companies that have developed particular interests
14 in larch as a promising species and there is no reason
15 to think that we will not have another outbreak of
16 larch sawfly in the near future. It certainly has the
17 ability to kill trees very quickly.

18 Q. Are you familiar, Dean Carrow, with
19 the existence of a natural parasitoid of the larch
20 sawfly - and I'll spell this out - called mesoleuis
21 tenthredinis?

22 And for the reporter: mesoleuis,
23 m-e-s-o-l-e-u-i-s, tenthredinis,
24 t-e-n-t-h-r-e-d-i-n-i-s.

25 Dean Carrow, are you familiar with that?

1 A. Well, I'm aware that there are a
2 number of parasites of larch sawfly that have been used
3 in the past on a very localized basis to try to bring
4 sawfly under control and I will accept that that may be
5 one of them.

6 Q. All right.

7 A. I don't recall the particular
8 species.

9 Q. And in the past for the outbreaks
10 that occurred, and I had looked at MOE Interrogatory
11 No. 4.

12 A. Mm-hmm.

13 Q. In the past for those outbreaks it's
14 true; is it not, that they used parasites as a control
15 mechanism?

16 A. Yes. There are records of a number
17 of parasite releases having been made, I believe from
18 1910 to 1962, in that time period.

19 Q. Are you aware of any current research
20 that is being done into one or more of these parasites
21 that were used in the past?

22 A. Not in that particular -- not in
23 those particular parasites for larch sawfly, Ms. Kleer,
24 but perhaps this is a chance to mention that in fact I
25 am very, very familiar with the technology of the use

1 of parasites for forest insect control being personally
2 involved in a major project to develop that particular
3 technology, but it involves a slightly different
4 approach, in fact quite a different approach than
5 what's referred to in the literature here and, that is,
6 the mass production and mass release of parasites to in
7 fact bring outbreaks under control.

8 The classical approach that's referred to
9 in the answer here was one in which relatively small
10 numbers of parasites were released on a point-by-point
11 basis with the hopes that they would become established
12 and they would reproduce and gradually spread
13 throughout the area of the infestation, and that has
14 been the so-called classical biological approach that
15 has been taken with parasite predator reproductions.

16 Q. So at this point you are involved in
17 a research project on mass production?

18 A. Yes, that's right.

19 Q. And has that been tested in the field
20 at all?

21 A. Yes, it has.

22 Q. And could you refer to me what pests
23 it has been tested against?

24 A. It's been tested against spruce
25 budworm in the area of the undertaking.

1 Q. And what is the name of that
2 parasite?

3 A. It's called trichogramma,
4 t-r-i-c-h-o-g-r-a-m-m-a.

5 Q. And this trichogramma, is it
6 presently used on a commercial basis or only on an
7 experimental basis?

8 A. It's been used on an experimental
9 basis up to this point. And I should add, Ms. Kleer,
10 that this is a co-operative project which the Ministry
11 of Natural Resources has provided considerable funding
12 for since about 1982.

13 It involves the University of Toronto,
14 University of Guelph, it involves Forestry Canada and I
15 think more importantly, recently it involves
16 Ceiba-Geigy Limited as the major industrial partner,
17 and the objective of the current program is in fact to
18 bring that technology to the commercial stage where in
19 fact that particular parasite is commercially produced
20 for sale and for operational use.

21 Q. In your opinion, based upon your
22 experience with this particular parasite and the
23 parasite release technology that you have been working
24 on, would that constitute, based upon the evidence you
25 have now, or may it constitute an effective means of

1 control for this particular parasite -- sorry, for this
2 particular pest; namely, the larch sawfly?

3 A. Oh, for larch sawfly? I think that
4 would be really very conjecturable on my part at this
5 point. I think the main value of this particular
6 technology is not that it will be a silver bullet, that
7 it will be a universal solution but, as we pointed out
8 in our evidence - and certainly others have pointed
9 out - the preferred approach is one of integrating pest
10 management.

11 And my own feeling is that that
12 particular technology, using what is called inundated
13 release of parasites, is a very valuable component of
14 integrating pest management in the sense that it can be
15 used, particularly in environmentally sensitive
16 situations it can be used very, very effectively, it
17 can be used in combination with registered pesticides
18 in a sequential manner. So it has a lot of potential
19 there as a part of an integrated pest management
20 approach to pests such as larch sawfly or spruce
21 budworm.

22 Q. When you said it was good for
23 environmentally -- or it could be good for
24 environmentally sensitive areas, did you mean then in
25 sequence with a pesticide -- a chemical pesticide, or

1 on its own?

2 A. I think in -- certainly in some areas
3 in which it's inadvisable to use any form of pesticide,
4 obviously it has some merits on its own.

5 The application rates and timing and so
6 on for that sort of thing really have yet to be
7 refined, although we have some reasonably good ideas of
8 what would be involved in that.

9 Q. Okay. If we can go back just to
10 clarify. This particular one is being developed for
11 the spruce budworm, trichogramma; is that correct?

12 A. That's right.

13 Q. If we talk then about the larch
14 sawfly would it, in your opinion, be a worthwhile
15 research endeavour to look at parasites for the larch
16 sawfly, given that it has in fact been used in the
17 past, parasites have been used in the past?

18 A. I don't have any idea, Ms. Kleer, how
19 effective those parasites were in the past really. In
20 many of those reports of releases of parasites the
21 follow-up work really was done only to the extent of
22 trying to establish whether that parasite had
23 established itself and was still in the area.

24 The attempts to quantify the level of
25 control achieved with those is really very limited, so

1 I can't comment one way or the other as to whether
2 those particular parasites have potential.

3 The other thing that makes the sawfly a
4 bit complex is that it has the very unfortunate habit
5 of burying its needles within the needle -- sorry,
6 burying its eggs within the needles, so it's not an
7 exposed egg, and that means that it's much harder for a
8 parasite to get at.

9 The spruce budworm egg, as we know, is
10 well exposed and the parasite has little difficulty
11 finding it, and so it's a technology that perhaps has
12 limited value against sawflies.

13 Q. But we don't have any evidence at
14 this time as to the effectiveness of parasites against
15 the larch sawfly, given the historical nature of
16 disturbance?

17 A. No, we don't. I think, you know, as
18 a very general observation the biologicals that have
19 been promising against sawflies are viruses, in fact
20 that's the technology that seems to hold the greatest
21 potential for success for sawfly pests in general.

22 Q. All right. Let's look then at the
23 jack pine sawfly. And speaking of viruses, I think one
24 of the answers to the MOE Interrogatory No. 4, which
25 you were referring to earlier which is part of Exhibit

1 1136, indicates that the borrelina virus,
2 b-o-r-r-e-l-i-n-a, is a natural regulator of the jack
3 pine sawfly. Would you confirm that?

4 Q. And I'm referring specifically to the
5 article by McLeod and Smirnoff contained in the answer
6 to MOE Interrogatory No. 4 on this panel, and page 164
7 within that article.

8 MADAM CHAIR: Exhibit 12 -- which one?

9 MS. KLEER: Sorry, Exhibit 1136.

10 MADAM CHAIR: And question...?

11 MS. KLEER: It's Question No. 4 of the
12 MOE to which I attached two papers, one of them being
13 by McLeod and Smirnoff. And if you look at page 164
14 that's where I'm pulling this information from.

15 MADAM CHAIR: Thank you.

16 DEAN CARROW: Yes. I'm sorry, what was
17 the question?

18 MS. KLEER: Q. The question was simply
19 to confirm: Is the borrelina virus a naturally
20 occurring virus that has been shown at least in one
21 instance to act as a natural control of the jack pine
22 sawfly?

23 DEAN CARROW: A. Yes, I would confirm
24 that that is what McLeod and Smirnoff are reporting in
25 this paper.

1 Q. And are you familiar with any further
2 study on the borrelina virus?

3 A. No, I'm not.

4 Q. Would that be an area worthy of
5 consideration as a means of controlling the jack pine
6 sawfly?

7 A. Yes, I would certainly agree with
8 that. Again, I guess in the whole general discussion,
9 however, of limited resources available to carry out
10 research and research priorities, one would have to
11 look at that and say: Is this area sufficiently
12 important to justify reallocation of funds from some
13 existing research that was identified as a high
14 priority to that area, because right now that
15 particular pest and that particular type of research
16 has not been identified as one of a higher priority.

17 Q. Namely the jack pine sawfly?

18 A. The virus for control of jack pine
19 sawfly.

20 Q. All right. Then has control of the
21 jack pine sawfly, apart from specifying the virus, been
22 identified as a research priority?

23 A. I'm not aware that it has. Certainly
24 in the context of pests that seem to be more
25 intractable with respect to control, the sawfly itself

1 again is one of these strongly cycling insects that has
2 a habit of rising to epidemic levels quickly but then
3 collapses quickly as well, and in the past generally we
4 have been able to tolerate the damage caused by jack
5 pine sawfly.

6 Q. When you say tolerate, in what sense
7 are you using that word?

8 A. It's been an insect that has caused
9 some level of top kill of the trees. It doesn't -- to
10 the best of my understanding, it doesn't cause
11 wide-spread mortality of trees, so it's not -- if you
12 want to rank the pests there that are of importance, I
13 don't think it's up near the top. So it would be a
14 matter of getting agreement that that particular pest
15 was important enough to, again as I say, justify
16 reallocating funds from resources -- from an area that
17 is currently considered to be high priority into that
18 area of research, because there is no new money for
19 research these days, so if you want to undertake
20 research on jack pine sawfly virus, you have to
21 terminate some other program.

22 Q. So then you would still agree
23 though -- or you would still hold the position, I would
24 take it, that this is a major forest pest as identified
25 by the Forest Research Pest Institute? I think that's

1 what it's called.

2 A. It's a -- I don't think it's listed
3 in Table 12 simply because in 1987 there wasn't a major
4 forest pest, but I would certainly confirm that
5 periodically -- or am I wrong here, is jack pine --
6 yes, it is. Yeah, under sawflies, that's right.
7 Certainly it shows up periodically as a major forest
8 pest.

9 Q. Would you agree though that with
10 respect to sawflies viral controls, for instance the
11 Lacont virus, can be very effective if introduced?

12 A. The Lacont virus is highly effective,
13 that's right.

14 Q. Okay. I'd like to look for a moment
15 at the sawyer beetle. Now, I asked you this question
16 earlier, the sawyer beetle is not the same as the bark
17 beetle; is that correct?

18 A. Well, bark beetle is a very generic
19 term and it's not a recognized taxinomic
20 classification.

21 Q. Okay.

22 A. Bark beetle simply means it's a
23 beetle that infests the bark, invades the bark of trees
24 and feeds on the inner portions of the stem. In that
25 sense, the sawyer beetle is a bark beetle.

1 Q. All right.

2 A. In the sense that it invades the
3 tree.

4 Q. Are you getting tired as well as me.

5 A. Right. Just mention those words
6 and...

7 Q. All right. In the European context
8 is it not true that they have used quite a number of
9 silvicultural control methods to control bark beetles
10 of which a sawyer beetle would be a type of bark
11 beetle?

12 A. In Europe they use those techniques,
13 in British Columbia and coastal western Alberta they
14 use those techniques as well, as well as the western
15 United States and southern United States.

16 Silvicultural -- in fact I would say the
17 silvicultural control of bark beetles is the norm,
18 silvicultural control including harvesting.

19 Q. Perhaps you could indicate to me the
20 different types of silvicultural control mechanisms
21 that are used for bark beetles?

22 A. Well, I'm more familiar with mountain
23 pine beetle, for example, in the west and I'm not
24 familiar particularly with bark beetles in the area of
25 the undertaking because really they haven't emerged to

1 the point where they are a serious problem, or to use
2 Mr. Churcher's term, of current concern I think.

3 They tend to be fairly limited in their
4 effect in the area of the undertaking. But in the
5 west, for example, mountain pine beetle is managed
6 through a combination of directed harvesting operations
7 in which trees that are obviously attacked and infested
8 with mountain pine beetle are preferential;ly removed
9 and destroyed, because those trees tend to be -- I'm
10 sorry, the infestation tends to be very localized and
11 it's boundaries -- the bounds of the infestation are
12 even defined, so it's not a difficult matter to
13 undertake logging or harvesting to remove those trees,
14 to destroy them.

15 The other technique that's used very
16 effectively now is to use a pheromone, and I welcome
17 the opportunity to introduce this term again because I
18 should spell it out this time for the purpose of the
19 reporter. It's p-h-e-r-o-m-o-n-e.

20 And those are chemicals -- biochemicals
21 if you wish that are used with mountain pine beetle to,
22 in fact, attract beetles into what we may call a trap
23 tree for example, so a particular tree can be baited
24 with pheromone and it can be used to aggregate or draw
25 in mountain pine beetle from the surrounding area and

1 in fact thousands and thousands of beetles can be
2 aggregated into a single tree or a single log or a few
3 logs, if you want, and those logs can then be
4 destroyed.

5 So that's a very effective way of
6 controlling that class of insect in that setting and,
7 in fact, that's -- there is no chemical, really they
8 don't use a chemical control other than the use of
9 pheromones and sanitation measures, I guess we would
10 call them, in terms of burning or destroying that
11 material.

12 Q. In your opinion, would those
13 silvicultural control mechanisms used for this
14 particular pest be transferrable to the area of the
15 undertaking, if necessary?

16 A. I think the principles are sound,
17 they're quite sound. The difficulty that they've
18 encountered in British Columbia is, as I guess many
19 jurisdictions have, is that the bark beetles are well
20 ahead of them, and in fact they are killing the forests
21 faster than they can harvest it, so that while they are
22 attempting to eliminate what they call the hot spots,
23 they recognize that they still have a very wide-spread
24 problem that's expanding beyond their ability to
25 harvest and trap the insects.

1 Q. Mm-hmm.

2 A. So I guess from a strategic
3 standpoint, if one were to detect that type of problem
4 very early in the game, then that's a good strategy for
5 trying to manage that problem.

6 Q. All right. Then the last pest about
7 which I have a few questions is the oak leaf shredder.
8 And again, can someone tell me what the typical
9 characteristic outbreak cycle and frequency is for the
10 oak leaf shredder?

11 A. Well, it's -- very generally, Ms.
12 Kleer, as the name suggests, it's a defoliator of oak,
13 it occurs throughout the northern part of southern
14 Ontario and then well up into the -- along the north
15 shore of Lake Huron, areas such as that.

16 A rather difficult pest to control
17 because it has the bad habit of rolling itself within a
18 leaf, within an emerging leaf, so that it's very well
19 protected and it feeds within the leaf itself -- within
20 the rolled leaf.

21 Q. Mm-hmm.

22 A. It's considered to be a major
23 contributor to oak decline or oak dieback, if you want.
24 I don't know that it has been demonstrated as a tree
25 that -- well, I don't think it's been demonstrated as a

1 factor that can by itself cause tree mortality, but it
2 certainly will kill branches on those trees and, as I
3 say, contributes to tree dieback.

4 Q. Is it true that within the area of
5 the undertaking oak leaf shredder has not typically
6 been seen to date?

7 A. I believe it is seen, yes, yes. In
8 fact this table indicates that it is, in 1987, it was
9 causing severe damage in the area of the undertaking.

10 Q. All right. Perhaps we could look for
11 just a moment at Volume 113, page 18906.

12 MS. KLEER: Do you have that one?

13 MS. CRONK: Sorry, just give me a moment.

14 MS. KLEER: Q. If you could just read
15 the top of that page briefly, page 18 906.

16 DEAN CARROW: A. Yes.

17 Q. Doesn't that indicate that MNR stated
18 that the outbreaks which they treated were all outside
19 of the area of the undertaking?

20 A. In the years 1977 to 1980 and '83
21 they were outside the area of the undertaking, the
22 areas treated.

23 MS. CRONK: Well, I'm sorry, Madam Chair.
24 I'm conscious of the fact that you don't have the
25 transcript, my friend just alluded to the answer to a

1 question, but not to the question.

2 MS. KLEER: Okay, perhaps --

3 MS. CRONK: Sorry, you don't have it
4 either, so perhaps that wasn't intentional.

5 MS. KLEER: Q. The question was, and I
6 think you told me earlier -- confirmed earlier that oak
7 leaf shredder is a major insect pest in the area of the
8 undertaking, and the answer was - and this is part of
9 Ms. Cronk's cross-examination:

10 "It can be, yes, although I believe all
11 of the areas that were treated in the
12 years '77 to '80 as well as 1983 are
13 actually outside of the area of the
14 undertaking."

15 MS. CRONK: Thank you.

16 MS. KLEER: Q. All right. Then I
17 understand then, or am I correct in understanding that
18 at this point there are -- or certainly in '87, oak
19 leaf shredder was considered a problem?

20 DEAN CARROW: A. In the area of the
21 undertaking.

22 Q. Yes.

23 A. Yes, that's right.

24 Q. All right. Now, it's true, is it not
25 that B.t. has been used or has been tested against oak

1 leaf shredder as a means of control; is that correct?

2 A. I would have to refresh my memory on
3 that, Ms. Kleer.

4 Q. Could anyone else on the panel speak
5 to that.

6 MR. TOMCHICK: A. No.

7 MR. BUNCE: A. (nodding negatively)

8 MR. FERGUSON: A. No.

9 Q. All right. Then I won't proceed on
10 that line of questioning.

11 All right. I'd like to go back then for
12 a moment to your statement on page 174, and this is in
13 the centre of the page and I will just read the
14 sentence:

15 "Thus, the current no chemicals policy of
16 the Ontario government leaves the timber
17 manager with no available control agents
18 for at least 11...", which has
19 subsequently been revised to 12,

20 "...major forest pests and this is
21 an unacceptable position when one
22 considers the value of the trees and
23 stands damaged by these pests and the
24 importance of the timber resource in the
25 province."

1 Now, we have seen -- would you confirm
2 that you have given me a number of instances where
3 other controls, other than chemical control agents and
4 other than biological control agents, have in fact been
5 used against some of these major pests in the area of
6 the undertaking as of 1987?

7 DEAN CARROW: A. I couldn't confirm
8 that, Ms. Kleer, because really in order to answer that
9 question in a credible fashion one would have to refer
10 to Table 13 which lists all of the insecticides that
11 are federally registered and provincially approved by
12 Ministry of the Environment for forest and woodlands
13 management use in Canada. The forest manager is not
14 entitled to use any material that is not on that list.

15 Q. I appreciate that.

16 A. So really there are -- the things
17 which we have talked about in terms of pheromones, in
18 terms of viruses are not registered, and in fact they
19 are not even commercially available.

20 Q. All right.

21 A. So the options open to the manager
22 are there in front of you on Table 13 and those are all
23 of the options in terms of insecticides.

24 Q. Okay. Now, but in terms of
25 silvicultural control mechanisms there are other

1 silvicultural control mechanisms for which one does not
2 require registration which you have referred to in your
3 evidence; is that correct?

4 A. I can think of one with respect to
5 mountain pine beetle which has no application in the
6 area of the undertaking. I can think of one with
7 respect to white pine weevil and the members of the
8 panel have discussed that in terms of leader clipping.
9 That's right.

10 Q. Do the other control mechanisms that
11 we discussed; namely, the pheromones, viruses that have
12 not yet been developed and commercially registered --
13 or registered for commercial use rather, that those
14 hold promise for controlling the pests that we have
15 looked at in Table 12?

16 A. I believe they hold considerable
17 promise, but I have to qualify that answer, I guess, by
18 saying that we in Canada, and particularly in Ontario,
19 have to deal with the realities in front of us.

20 I have another duty at the present time
21 and that is to serve as forestry representative on the
22 Federal Pesticides Registration Review and I can tell
23 you from that experience that the challenge of getting
24 new insect control agents registered in Canada, be they
25 biological agents, be they biochemicals, be they

1 chemical insecticides, is a bit overwhelming and it's
2 overwhelming for a number of reasons, it's not a simple
3 situation.

4 I think particularly of viruses, and we
5 are now facing the situation in which the regulatory
6 authorities in Ottawa are becoming increasingly
7 apprehensive about viruses and the release of viruses
8 into the environment.

9 Whereas I mentioned earlier, for example,
10 the technology of developing trichogramma or parasites,
11 when we started that research project in 1982 we
12 enquired with Ottawa as to what the registration
13 requirements for parasites would be and they said there
14 would be none.

15 That is not the case in 1990. They have
16 said very explicitly they will have to be registered,
17 which means they will have to go through toxicological
18 testing and environmental testing, and this panel has
19 heard -- or this Board has heard evidence in previous
20 panels that we are looking at time frames in the order
21 of 10 years and investments in the order of \$15-million
22 to carry out those testing programs.

23 I think you can appreciate, faced with
24 that type of scenario, many many companies say: No,
25 thanks, and in fact turn their back on the development

1 of that technology. We represent too small a portion
2 of the market to justify that type of investment.

3 Q. But is it also true that the same
4 limitations for the federal process that you've
5 referred to will apply to a chemical, a new chemical as
6 well?

7 A. It applies to all insect control
8 agents.

9 Q. In Canada, for the federal review,
10 would the level of data required for parasite and the
11 virus, as you understand it to be now, be comparable to
12 that of a chemical insecticide, or would it be less?

13 A. Well, we can't answer that question
14 for parasites because Ottawa has not even defined the
15 protocols for testing for parasites, so nobody knows
16 what tests would be required.

17 They are currently trying to deal with
18 testing protocols for materials such as pheromones.
19 They have not even defined the testing protocols for
20 that class of chemical; namely, pheromones. They are
21 having continuing difficulties with the protocols for
22 viruses, and all I can say is it's a very dynamic
23 situation.

24 Q. Just to clarify, the pheromones that
25 you referred to earlier that are in use on the west

1 coast, are they registered for B.C. or are they not
2 registered?

3 A. No, and they are not registered.
4 They are being used in a very specific manner now, as I
5 said, in baiting trap trees and with that particular
6 type of delivery, if you want, I hesitate to use that
7 word, but with that particular type of use pattern the
8 province, I guess, has accepted that as being an
9 acceptable way of using the material without being
10 federally registered.

11 We have -- in Ontario, for example, we
12 already have pheromones identified for the spruce
13 budworm, for the jack pine budworm, for gypsy moth,
14 those three at least. We know what those pheromones
15 are chemically -- they have been synthesized on an
16 experimental basis. Potentially they are -- they have
17 potential in terms of integrated pest management, but
18 none of them are registered.

19 Q. Are you familiar with the
20 registration process in the States for biorational
21 pesticides or is that not something you are familiar
22 with?

23 A. I'm not intimately familiar with it
24 at all.

25 Q. All right. I see that from CV that

1 you were President of the Entomological Society of B.C.
2 at one point; is that correct?

3 A. That's correct.

4 Q. Are you currently a member of the
5 Entomological Society of Canada?

6 A. Yes, I am.

7 Q. Okay. So were you familiar with this
8 1986 report, Exhibit 1209?

9 A. Yes, I was.

10 Q. You were. If I could turn back to
11 that and look at page 32, I'm look at the heading
12 Research Manpower and specifically at the third
13 paragraph.

14 Can you confirm that this committee,
15 which was a Special Committee under the entomological
16 Society of Canada concluded, based on a comparison of
17 the scientists working primarily in invertebrate
18 pathology in industrialized countries of Canada, Great
19 Britain, USSR, USA, France, West Germany and Japan,
20 that among those Canada has the least commitment to
21 this kind of research; namely, research on invertebrate
22 pathology?

23 A. Using that particular parameter and
24 that's what the authors say, I have no reason to
25 question that.

1 Q. Do you agree with the conclusion that
2 the authors of this report reached that:

3 "...this erosion of research effort in
4 the area of microbial control should be
5 rectified..." in your opinion?

6 A. Well, I guess in response to that,
7 Ms. Kleer, I can't help but acknowledge that that
8 statement could be applied generally to research in
9 Canada without qualifying it to invertebrate pathology.
10 Of the seven nations, we are right at the bottom in
11 terms of the amount of dollars we invest in research.
12 It's a deplorable situation and it doesn't apply only
13 to invertebrate pathology.

14 Q. But it does apply to invertebrate
15 pathology?

16 A. Apparently.

17 Q. All right.

18 MS. KLEER: If I had five minutes I could
19 probably cut down on some of my cross and just limit
20 it, if I could have five minutes.

21 MADAM CHAIR: How much do you think you
22 have?

23 MS. KLEER: Well, if I cut it down I
24 should probably have half an hour more, less than half
25 an hour more.

1 MADAM CHAIR: Do you want to take the
2 afternoon break now and come back in 20 minutes and you
3 can finish off fairly quickly?

4 MS. KLEER: Yes.

5 MADAM CHAIR: Then, Mr. Freidin, you will
6 follow directly.

7 MS. CRONK: Madam Chair, would it be
8 appropriate to address you when you return from your
9 break as to some scheduling implications of the
10 information we have?

11 MADAM CHAIR: Well, do you want to talk
12 to us --

13 MS. CRONK: Would you prefer to do it now
14 or...

15 MS. KLEER: I will be able to tell you
16 after the break how long I expect to be.

17 MS. CRONK: It wasn't specific to you.

18 MS. KLEER: Oh, okay.

19 MR. MARTEL: We should know how long Mr.
20 Freidin is going to be as well.

21 MR. FREIDIN: Fours hours.

22 MR. MARTEL: Still four hours?

23 MR. FREIDIN: Yes.

24 MADAM CHAIR: How long will you be in
25 re-examination?

1 MS. CRONK: I don't know, but at the
2 moment, Madam Chair, it is certainly an hour and a half
3 to two.

4 MR. FREIDIN: And then MOE.

5 MADAM CHAIR: Ms. Seaborn?

6 MS. SEABORN: My original estimate, Madam
7 Chair, was two to three hours. Ms. Kleer has covered
8 one whole area that I had intended to cover with Dean
9 Carrow, so I think I will be able to substantially
10 reduce my estimate, but I think an hour and a half is
11 still fair.

12 I will do my best as well this evening
13 and it will again depend on what Mr. Freidin does
14 tomorrow morning. I can't be any more accurate than
15 that.

16 MR. FREIDIN: Madam Chair, I think I can
17 indicate that it will be a full four hours. I will
18 have to go some to get it done in four hours. I don't
19 think I am underestimating it at four hours.

20 MADAM CHAIR: Ms. Cronk, what's your
21 submission?

22 MS. CRONK: I have a number of
23 suggestions. As some friends of mine want to say, the
24 good news or the bad news first.

25 Clearly I anticipate there is going to be

1 a timing problem. It may be well be that Ms. Seaborn
2 will be finished late tomorrow afternoon in time for
3 re-examination to begin. I know that the Board must
4 rise at five tomorrow. I do not anticipate, based on
5 the scheduling estimates that I now have, that I can be
6 complete that re-examination by five o'clock if I am
7 starting at four. That can't be done.

8 Having said that, the only practical
9 suggestions that I have are a range of options, several
10 of which I know will be perhaps not in any way
11 acceptable to the Board, but I am obliged to put them
12 all in front you. The first is to sit starting earlier
13 tomorrow morning in the hope that we would find further
14 time at the end of the day to allow completion of
15 re-examination, the second is to sit Saturday morning,
16 the third is to sit this evening, the fourth is to have
17 this panel recalled when Drs. McCormack and Carrow are
18 available after their return from out of the country,
19 which could well be the month of September.

20 None of those are appealing to me, Madam
21 Chair, I know most certainty not to our clients, and I
22 don't urge any particular solution on the Board, but I
23 did want to draw the problem to your attention because
24 I am not at all confident that we can complete within
25 the normal hours by five o'clock tomorrow.

1 MADAM CHAIR: All right. Thank you, Ms.
2 Cronk. We will take a 20-minute break now.

3 MS. SEABORN: Madam Chair, can I make one
4 submission in that regard. With respect to the
5 suggestion of recalling the panel in September, I would
6 not want to be in the position of having to
7 cross-examine this panel in September, mainly because
8 we would have hopefully already dealt with the
9 remainder of the Industry's case and this is one of the
10 activity panels and this would put us at a severe
11 disadvantage in term of how we are approaching the
12 Industry's case by having to put off that
13 cross-examination.

14 I just raise that. We will see where we
15 are tomorrow and I am hoping that I will be finished
16 and it would be a recall for re-examination, if
17 anything.

18 MS. CRONK: Well, it perhaps goes without
19 saying that I think it grossly unfair to the witnesses
20 to put them in that situation, but I am obliged to put
21 all options in front of you. That is one.

22 MADAM CHAIR: All right. Thank you.
23 ---Recess taken at 3:25 p.m.
24 ---On resuming at 3:55 p.m.

25 MADAM CHAIR: Please be seated.

1 Ms. Kleer, how much longer are you going
2 to be?

3 MS. KLEER: Well, I've pared this down to
4 essentially two questions.

5 MADAM CHAIR: All right. Why don't we
6 finish your questions and then we will talk about the
7 scheduling for the rest of the hearing for this panel.

8 MS. KLEER: Okay.

9 Q. Dean Carrow, would you agree that
10 given present record keeping systems for silvicultural
11 control mechanisms for insects that are within the area
12 of the undertaking, that it is not possible at this
13 point to make any determination as to what degree
14 silvicultural controls are contributing to outbreak
15 control, containment or foliage protection?

16 DEAN CARROW: A. I'm afraid I'm not in a
17 position to that answer that question conclusively, Ms.
18 Kleer, because I'm really not that familiar with the
19 silvicultural control records to which you refer.

20 Q. Okay.

21 A. I presume those are Ministry records
22 in the sense that the Ministry has the responsibility
23 for insect control on Crown land.

24 Q. Well, perhaps I can refer then to one
25 of the panel members. If you use a silvicultural

1 control mechanism on your particular FMA, is there any
2 central reporting system which you record your results
3 in or does it just become part of the understanding
4 that you develop on your particular FMA as to one
5 particular control mechanism?

6 MR. STANCLIK: A. Are we talking insect
7 pest control?

8 Q. Yes. I'm talking specifically about
9 silvicultural controls like leader clipping.

10 Perhaps, Mr. Smith...

11 MR. BUNCE: A. Even -- oh, sorry.

12 Q. Or Mr. Bunce, that's fine.

13 A. Even the leader clipping again is the
14 responsibility of the Ministry of Natural Resources, so
15 it won't have a direct bearing on us.

16 Q. Okay. And that's true of other
17 silvicultural control mechanisms as well?

18 A. You would have to give me another
19 example.

20 Q. Well, we don't use pheromones at this
21 point, so I can't give you that.

22 My next question refers to the MNR
23 no-chemicals policy. At this the point I would like to
24 introduce an excerpt from Hansard, October 19 --

25 MR. FREIDIN: By I way, I take issue as

1 to it being characterized as the no-chemical policy.
2 That's an issue as to whether that's what the document
3 is.

4 MS. KLEER: All right. I was using that
5 for summary purposes. (handed)

6 MADAM CHAIR: Thank you. Exhibit 1210.

7 MS. KLEER: I'm not sure I said this for
8 the record, it's an excerpt from Hansard for October
9 19, 1989.

10 ---EXHIBIT NO. 1210: Excerpt from Hansard dated
11 October 19, 1989.

12 MS. KLEER: Q. I will address this
13 question to Dean Carrow again. Have you had an
14 opportunity to review this, Dean Carrow?

15 DEAN CARROW: A. Yes, I have.

16 Q. Does this indicate that as of
17 October, 19, 1989 the no-chemicals policy is supported
18 by the present Minister of Natural Resources, again,
19 using no-chemicals policy in an abbreviated sense?

20 A. I would interpret the statement of
21 the Minister of the House to mean that specifically in
22 the sense that she says:

23 "...we are continuing to monitor it..."
24 referring to the program, "...but spraying with B.t.
25 only continues to be our policy."

1 And I would interpret that as no
2 chemicals.

3 Q. Okay. If we look back to the first
4 statement of this no-chemicals policy, again using that
5 in the abbreviated sense, which was made by the
6 Ministry of Natural Resources in May of 1985, who was
7 Mr. Harris, that was done in Exhibit 635 -- or referred
8 to in Exhibit 635, and I would like to look at that for
9 a moment.

10 Again I will direct my questions to Dean
11 Carrow on this. Dean Carrow, do you have a copy of
12 that in front of you?

13 A. I don't have that particular exhibit
14 in front of me.

15 Q. I'm trying to find the page for
16 reference, I'm sorry. Okay. Looking at page 2 of
17 Exhibit 635, in the middle paragraph there, it says:

18 "The decision to spray B.t. follows a
19 careful analysis of the potential impact
20 of the infestation problem throughout
21 Ontario, as well the public review of
22 various forest management options
23 presented in open houses held in January
24 and earlier February this year", Mr.
25 Harris said, and that statement was made May 7, 1985.

1 Now, does that statement indicate to you,
2 Dean Carrow, that the decision made by the Minister was
3 a strictly political decision or was it one that in
4 fact took into account the potential impact of the
5 infestation?

6 A. Certainly the way in which that is
7 worded; in other words, the Minister's words indicate
8 that the potential impact was analysed and the
9 conclusion was reached to use B.t. only for that
10 particular year.

11 Q. Well, in your opinion, then, was
12 there some basis - and I will use the word scientific
13 basis - to conclude that the B.t. only policy was a
14 reasonable policy at the time based upon that criterion
15 of potential impact of infestation, in your opinion?

16 A. I can't comment on the particular
17 situation in 1985, Ms. Kleer, with respect to
18 infestation levels and tree damage and so on, but as a
19 general proposition I can accept that in any one given
20 year in fact conditions may be such that a spray
21 program that relied entirely on B.t. would be
22 appropriate, depending on the conditions of the trees,
23 the infestation, the objectives to be achieved, that
24 type of thing.

25 Q. All right. If I could just turn then

1 for a moment to page 176 of your witness statement and
2 look at the first sentence on that page, and I will
3 read it:

4 "Political decisions preventing the use
5 of all chemical insecticides in the
6 forest environment are without scientific
7 basis."

8 Now, when you made that statement, were
9 you making a specific reference to or meant to make a
10 specific reference to the 1985 policy or political
11 decisions in general?

12 A. That's a general statement and
13 certainly applies to the situation in the Province of
14 Ontario that started in 1985 and has been continuing in
15 subsequent years, which has led to a position in which
16 no chemicals are used for use against forest insect
17 pests.

18 The same general statement, however,
19 applies to other jurisdictions and, in fact, in my view
20 it applies to pesticides generally.

21 Q. But doesn't the statement that we
22 have just looked at, the 1985 statement, indicate that
23 the Minister took into account and did a -- in his
24 words:

25 "A careful analysis of the potential

1 impact of the forest infestation
2 problem."

3 A. I think in response to your earlier
4 question I indicated that that seems to be the intent
5 of his particular statement for the situation in 1985.

6 It doesn't necessarily follow that that
7 same situation existed in 1986, 1987, 1988, 1989 and
8 according to the statement of Ms. McLeod in the house,
9 October of 1989, that probably will -- the intent there
10 is that it will apply in 1990.

11 So the point that I have made in the
12 evidence, Ms. Kleer, is that the generic ban on the use
13 of chemicals province-wide against any pest in any
14 situation has no scientific basis.

15 Q. Would you agree that in 1985 when the
16 statement was made that there was a basis looking at
17 the level of infestation for making that decision?

18 A. No, I have not had an opportunity to
19 look at the particular infestation levels that were
20 present in 1985 or the previous damage to the trees or,
21 in fact, the tree and stand conditions that the program
22 was designed for or the objectives.

23 So I wouldn't be prepared -- I just can't
24 comment on whether this was appropriate for that
25 particular situation.

1 Q. But it does indicate, does it not, in
2 Exhibit 635 that the policy, as it was then, enunciated
3 by the Ministry, Mr. Harris, that it was based, in part
4 at least, on a careful analysis of the potential impact
5 of the infestation problem throughout Ontario?

6 A. That's what the statement says and I
7 have no reason to dispute the statement that was made
8 by Mr. Harris at the time.

9 Q. All right.

10 MS. KLEER: That's the end of my
11 questions.

12 MADAM CHAIR: Thank you very much, Ms.
13 Kleer.

14 MS. KLEER: Thank you very much, Panel,
15 for your cooperation and ears.

16 MADAM CHAIR: Mr. Martel and I had a
17 lively discussion over the break about scheduling the
18 completion of this panel. I am going to tell you some
19 of our thought because I think it's time that we
20 brought all this stuff out on the table because this is
21 not an isolated example of the kind of barriers that
22 the Board has run up against in conducting this
23 hearing.

24 First of all, the Board resents very much
25 being put into the position unfairly, in our opinion,

1 of appearing to provide obstacles to completing the
2 presentation of the evidence. We have been sitting --
3 well, we would have sat five full days by tomorrow,
4 probably setting some kind of a new endurance record
5 for Boards doing this kind of business.

6 As it stands, Mr. Martel is always a
7 loser in these sorts of situations; he will be home for
8 36 hours this weekend and will be back here Sunday to
9 start first thing on Monday morning with Panel 9.

10 From the Board's point of view, we simply
11 see that the parties aren't cooperating with us. We
12 have said many, many times that it is in the interest
13 of all the parties to put your evidence to us
14 succinctly. There is simply no defense or no
15 explanation publicly for what's been going on in this
16 hearing for two years. There is simply no way of
17 justifying how long this hearing has taken,
18 particularly when we can't even forecast at this point
19 when it is going to be ending. This is quite
20 phenomenal and totally, totally unjustified.

21 What you are saying to us essentially by
22 what has taken place with this panel and with others --
23 but we just haven't seen any effort on the part of the
24 parties to discipline ourselves. We think that
25 everybody has taken too long and the forecasts of the

1 parties remaining we also think is much too long.

2 This comes in the heels, of course, of
3 other attempts the Board has made to speed this thing
4 up. We don't know what's going on with the
5 negotiations business except we have been told to wait
6 and see what happens, the scoping sessions have become
7 not very effective, we don't think, people show up and
8 they tell us how long they are going to take and they
9 go away and we are considering dropping the whole
10 exercise. We feel it has been a waste of time and it
11 is certainly not helping the Board. Everything we have
12 tried in two years to speed up this hearing has failed
13 as far as we are concerned and we simply see very
14 little left to us -- well, with which we get agreement
15 from the parties about how to handle this whole thing.

16 Having said that and expressing the
17 Board's resentment that we are put in the position of
18 having to assume the burden of the parties not
19 disciplining themselves to finish on time, we are going
20 to have to make some decisions about how to finish this
21 panel.

22 Obviously, we don't think it is very
23 satisfactory to bring the panel members back in
24 September. This hearing has cost enough money and
25 enough time already. We are not keen about the idea of

1 putting that extra burden on a party. It is not the
2 sort of thing the Board wants to do, but, at the same
3 time, the Board again, and I will restate it, we resent
4 very much that it is always the Board being unfairly
5 placed in the position of looking as though we are
6 either responsible for either holding up the hearing or
7 not doing something to expedite it and I think it has
8 got to be very clearly understood by the parties and on
9 the record that this Board has tried in every way to
10 accomodate what the parties wished to do and what they
11 think is fair and within their right to do, but at some
12 point there has to be an end to it.

13 Mr. Freidin, with respect to how we are
14 going to continue from now until tomorrow night, how
15 much time are you going to take to do your
16 cross-examination?

17 And before you answer me, we might just
18 say that we don't think a party -- the MNR needs to
19 cross-examine extensively on evidence from a party that
20 is essentially in support of your case. There are
21 intervenors whom we can see that there may be more
22 areas of disagreement, but surely you have a very good
23 sense at this point of hopefully a small number of
24 issues with which you would feel the need for extensive
25 cross-examination.

1 MR. FREIDIN: I cannot change my estimate
2 until I have a chance to assess all the questions. I
3 may be able to pare it down. I can't change that
4 estimate.

5 I am not intending to ask any questions
6 that aren't questions legitimately of clarification
7 that I think will be of assistance to my client. There
8 are, I can tell you right now, issues with the OFIA
9 that we have some difference of opinion on and I intend
10 to address those.

11 MADAM CHAIR: The Board is well aware of
12 where those differences of opinion are.

13 MR. FREIDIN: And I think there are
14 questions which were asked by the Board which I intend
15 to address because I think I can elicit information to
16 answer questions from the Board, which I don't believe
17 were fully addressed or addressed as fully as I believe
18 they could be, to be helpful to my client and the
19 Board.

20 MADAM CHAIR: Okay, that will be helpful,
21 but Ms. Cronk will also--

22 MR. FREIDIN: That's right.

23 MADAM CHAIR: --be doing that kind of
24 mopping up.

25 MR. FREIDIN: Right. But anything I do

1 in that nature will help save time at the other end as
2 well. I can't rely on Ms. Cronk to do my work.

3 MADAM CHAIR: No, but you don't have to
4 duplicate it either.

5 MR. FREIDIN: That's right.

6 MADAM CHAIR: One moment, please.

7 ---Discussion off the record

8 MR. FREIDIN: As I said before, Madam
9 Chair, I hear you.

10 MADAM CHAIR: Everybody's heard us for
11 two years now but it hasn't made any difference.

12 What we are going to do is: We are going
13 to finish by five o'clock tomorrow night, we are not
14 going to bring the panel back in September. We don't
15 think that's fair to either the panel members, or we're
16 certainly not going to add to the cost or the time it
17 takes to complete this hearing.

18 What we are going to ask is a guarantee
19 that we will be finished by five tomorrow. We will sit
20 this evening, Mr. Freidin will complete this evening.
21 We will take a dinner break and we will come back and
22 we will sit until -- if we can finish Mr. Freidin this
23 evening, then we should be able to finish Ms. Seaborn
24 quickly tomorrow.

25 MS. SEABORN: Yes, Madam Chair. My

1 estimate was an hour and a half, but I think that's a
2 very realistic estimate. I will probably be able to
3 stick to that.

4 MADAM CHAIR: And Ms. Cronk will finish
5 re-examination -- you weren't planning on taking -- you
6 haven't given us an estimate.

7 MS. CRONK: I will certainly be finished
8 if I'm on my feet tomorrow morning, Madam Chairman, no
9 problem, early afternoon I will be finished.

10 MADAM CHAIR: Well, if you could start --

11 MR. MARTEL: Now, if the three parties
12 remaining, Ms. Cronk, Mr. Freidin, MOE want to chat for
13 five minutes as to how they are going to best expedite
14 this so that Mr. Freidin isn't on his feet until
15 midnight, then we are prepared to take another five
16 minute break while you discuss that.

17 I mean, we're not trying to put you all
18 in a spot that somebody has to, I think it's inhumane
19 for somebody to go until eleven or twelve at night,
20 which includes us.

21 MADAM CHAIR: Most of us.

22 MR. MARTEL: And the witnesses and the
23 people working over here, but the thing is: We've got
24 to know by five, and how you work that out amongst
25 yourselves in the next five minutes might be helpful to

1 all of us as to what hours we sit tonight and tomorrow.

2 MS. CRONK: Mr. Martel, as I am still on
3 my feet, if I can respond to that. I think that's a
4 valuable suggestion, and obviously speaking for myself,
5 we will do that.

6 But there are two points that I would
7 like to make and the first is, speaking for myself, for
8 Mr. Shibatani and our clients, I wish to make it very
9 clear to the Board that there was from us and certainly
10 not from me any intention directly or indirectly to
11 suggest that this Board has not more than accommodated
12 any request that we have made with respect to this
13 panel.

14 I'm very conscious of the fact that
15 unexpected illnesses and scheduling difficulties in a
16 number of families made the timing of scheduling for
17 this panel most difficult, most of all for the Board
18 and the individuals concerned, and I was then and am
19 now grateful for the accommodations that the Board
20 made, so I just make that clear.

21 MADAM CHAIR: And the Board is not
22 putting any blame at all on the fact that we had
23 scheduling difficulties before we started, that doesn't
24 come into play to the time that it's taking.

25 MS. CRONK: I understand that, Madam

1 Chair, but nonetheless I'm conscious that the Board
2 agreed to sit, for example, at my request five days
3 this week to accommodate problems that arose because of
4 that and I repeat again, if it wasn't clear before,
5 that we are grateful for that.

6 I also take the remarks that the Board
7 has made about the overall timing difficulties, it's
8 obviously something that our clients and myself and
9 other counsel have been aware of and we will speak
10 further about that and see what we can do.

11 The other point, Mr. Martel, that I
12 should make clear, as you will of course appreciate, is
13 that the estimate of time from me for re-examination
14 depends upon what those before me do. So it is
15 impossible for me to do anything but give you my best
16 estimate today, nor can I -- I'd love to make a bargain
17 with Ms. Seaborn, for example, about what she did or
18 didn't do in cross-examination tomorrow, but I'm not at
19 all sure that that's realistic, but I'd be delighted to
20 speak, from my part, with my friends and see if that
21 can be accommodated.

22 MR. MARTEL: Well, you see, the only
23 reason I suggested it is: If we ask Mr. Freidin to go
24 on and somebody collapses at 10:00 tomorrow morning,
25 then it seems to have been ridiculous to sit until 11

1 o'clock tonight, that's the only point I'm trying to
2 arrive at.

3 If we can arrive at a convenient way of
4 the number of hours that we'll require this evening to
5 be done tomorrow, or if it's necessary to go that
6 route, then I think that should be canvassed in the
7 next five or ten minutes and we'll come back for a well
8 just to save everybody, needless sitting tonight and
9 then not have something to do tomorrow afternoon.

10 MS. CRONK: I agree, sir. Exactly.

11 MADAM CHAIR: Good. We will take -- how
12 long do we need?

13 MS. CRONK: I would suggest 10 minutes.

14 MADAM CHAIR: We will be back in 10
15 minutes.

16 ---Recess taken 4:15 p.m.

17 ---On resuming at 4:25 p.m.

18 MADAM CHAIR: Please be seated.

19 Ms. Cronk?

20 MS. CRONK: Madam Chair, we did meet and
21 if it's acceptable to the Board, I understand that what
22 is being suggested by Mr. Freidin and the rest of us,
23 is that we sit from now until 6:00, that would afford
24 Mr. Freidin about an hour and a half, and then he could
25 advise the Board at that time what his estimate was and

1 whether it had been refined and it may be that we could
2 adjourn at that point, if that was acceptable to the
3 Board and, if not, he'll alert you to that and you
4 could then indicate to us what you wish to do about a
5 dinner break.

6 It may not be necessary to take a dinner
7 break and come back; on the other hand, Mr. Freidin is
8 the only one who is going to be able to inform you of
9 that.

10 MADAM CHAIR: All right, thank you.

11 Mr. Freidin?

12 CROSS-EXAMINATION BY MR. FREIDIN:

13 Q. Dean Carrow, you have been at it for
14 a long time now, I can as easily start with Dr.
15 McCormack and perhaps you could -- I was going to start
16 with you, but perhaps you could indicate whether --
17 would you prefer that I do that, give you a break?

18 DEAN CARROW: A. It's up to you, Mr.
19 Freidin. I'm perfectly agreeable to continue.

20 Q. Okay. Well then, let me start with
21 you, then. Would you please get in front of you
22 Exhibit 1136 which are the interrogatories and, in
23 particular, the article by Carter. Do you have that?

24 A. Yes, I do.

25 Q. And Table 14 which was the subject

1 matter of considerable cross-examination by Ms. Kleer.
2 It's on page 181.

3 Now, firstly, would you turn to page No.
4 12 of the Carter article, please, Figure No. 3.

5 A. Yes, I have that.

6 Q. Now, in the cross-examination in
7 relation to Table 14 Ms. Kleer was asking questions as
8 to whether the information contained on Table 14 was
9 any indication as to the need for chemicals as opposed
10 to B.t., and you had a long discussion about whether
11 the information there was statistically valid in terms
12 of indicating that chemicals were better than B.t. or
13 whether the chemicals were in fact required.

14 I want to ask you: If you look at Figure
15 No. 3 of the Carter article and indicate -- or explain
16 that diagram and indicate whether it says anything as
17 to the necessity or usefulness of chemicals as opposed
18 to B.t.?

19 A. Yes. This Figure 3, Mr. Freidin, is
20 a graph that shows regressions or relationships, if you
21 want, between the per cent defoliation of current
22 year's growth and the larval population density of
23 spruce budworm in areas that have been untreated, areas
24 that have been treated with B.t., areas that have been
25 treated with fenitrothion.

1 And generally, in very general terms, it
2 shows that depending on the larval population density
3 the regression indicates that you would expect to have
4 more defoliation on the untreated area -- the highest
5 level of defoliation on the untreated area; the second
6 highest level of defoliation on the B.t. treated area;
7 and the lowest defoliation on the fenitrothion treated
8 areas for any given larval population density.

9 Q. All right. So if we just take point
10 4, larvae bud on the horizontal axis and draw a line
11 straight up, it would indicate that you would have, in
12 terms of the percentage current defoliation lost, on
13 the check block you would lose 90 per cent of the
14 current year's growth, approximately?

15 A. Yes, approximately, that's correct.

16 Q. And for B.t. you would lose
17 approximately 68 per cent of the current year's growth?

18 A. That looks about right, yes.

19 Q. And for fenitrothion you would lose
20 approximately 44 per cent?

21 A. Yes, approximately.

22 Q. And can you confirm for me that in
23 this particular report which was on page 19, the
24 conclusion states -- the very first conclusion in
25 relation to the effectiveness of the program indicates

1 that:

2 "Based on assessments of current
3 defoliation on branch samples
4 fenitrothion provided consistently
5 acceptable results in 1988 whereas B.t.
6 did not."

7 A. Yes, that's what the conclusion is.

8 Q. And can you agree with me, Dean
9 Carrow, that these graphs are based on original data?

10 A. By that do you mean field-derived
11 data?

12 Q. Yes.

13 A. I would have to confirm that, Mr.
14 Freidin. I haven't looked carefully at the origin of
15 the data for that graph.

16 Q. All right. Let us assume that it is,
17 all right?

18 A. Okay.

19 Q. Assuming that it is, would you agree
20 that the conclusions regarding effectiveness of
21 chemical versus B.t. in relation to this report is more
22 statisticlaly sound and scientifically valid than
23 perhaps the conclusion one can reach in that regard
24 from Table 14?

25 A. Could you ask -- could you repeat the

1 question again, please?

2 Q. All right. Let me put it this way:
3 There is some concern about the statistical validity of
4 any conclusion that you come to regarding the
5 effectiveness of B.t. versus chemical based on the data
6 you used for Table 14?

7 A. Yes.

8 Q. Now, I'm saying, I heard Ms. Kleer
9 suggesting that perhaps you should look at an actual
10 study, something in an actual one year's sample.

11 And I'm saying, if this data is in fact
12 data of a one-year sample, then it in fact addresses
13 the concern that she raised, at least in part, such
14 that the information in the Carter paper would be more
15 statistically sound or scientifically valid if you're
16 trying to draw a conclusion as to whether chemicals
17 were more effective than B.t.?

18 A. I would agree that, with that general
19 proposition, Mr. Freidin, the data without examining
20 that Figure 3 -- sorry, the origin of the data from
21 Figure 3, it suggests to me from my own past experience
22 that in fact those studies are often done with the
23 express purpose of illustrating that type of
24 relationship, so in fact the sampling is done for the
25 purpose of illustrating a relationship between

1 defoliation and larval population density for different
2 treatment regimes; whereas as I pointed out with Ms.
3 Kleer, that was not the purpose of Table 14 at all, and
4 we did not intend to imply that comparisons should be
5 made between B.t. and chemical in that table.

6 Q. Thank you. I would like next to deal
7 with an issue that -- or questions which were raised or
8 asked by Mr. Martel, and that was in relation to the
9 New Brunswick spray program. And you recall they were
10 spraying there every year and Mr. Martel was asking:
11 If they spray there every year, why doesn't -- if
12 they're spraying that much, why doesn't it sort of
13 solve the problem.

14 And you indicated that in New Brunswick
15 they don't have the luxury of losing any wood, they
16 have a very tight wood supply, is what I understand you
17 to be suggesting?

18 A. That's correct.

19 Q. And in Ontario, although no one likes
20 to lose wood volume, Ontario has the luxury of actually
21 allowing some loss to insects and it doesn't have the
22 dramatic effect that it might have on the Industry as
23 it might have in New Brunswick?

24 A. That's correct. As a matter of fact,
25 Mr. Freidin, if one looks carefully at the mill

1 requirements for the Province of New Brunswick they
2 require something in the order of 7-million cubic
3 metres a year plus, and in fact if you look at the
4 annual allowable harvest for the province it's somewhat
5 less than that, meaning that they actually have to
6 import wood each year to supply their mills. So they
7 cannot -- again, they don't have the luxury of
8 allowing their forests to be decimated by any pest.

9 Q. All right. Now, we heard evidence in
10 earlier panels, Mr. Armson in Panel No. 2 for instance,
11 where we looked at the budworm infestation in Ontario
12 over a length of time, and we heard evidence from him
13 and I think from Mr. Churcher that the budworm
14 infestation in Ontario starts in the western part of
15 the province and moves east, and it sort of goes up, it
16 peaks, and then it falls.

17 Is that your understanding of sort of the
18 history of the budworm infestations in this province?

19 A. I don't -- I'm not clear on what you
20 mean by peaks and falls. You mean geographically or
21 temporally?

22 Q. Both I guess. Temporally. You don't
23 have the high infestation all the time, it starts low,
24 you get more and more insects, there's an infestation
25 and eventually they die off or it goes down, and then

1 it comes back some years later.

2 A. That's right.

3 Q. It's cyclical in that --

4 A. In fact, if you look at the
5 historical records which have been published by
6 Forestry Canada which date back I think to 1911, and
7 those are annual records and there have been maps
8 generated to show the areas of moderate to severe
9 damage caused by budworm in the Province of Ontario.

10 I remember reviewing this a few years ago
11 and I think there were only - if my memory serves me
12 correctly - I think there were only three years since
13 1911 where spruce budworm was not causing severe damage
14 somewhere in the Province of Ontario; it's not always
15 in the same spot, it tends to shift across the north,
16 but it seems, as a general rule, in any given year
17 there is always some area of severe damage caused by
18 spruce budworm.

19 Q. All right. In New Brunswick, I
20 understand, it's a bit more pervasive than that in
21 terms of the geographical area -- the total area of the
22 province?

23 A. Pervasive in the sense of sustaining
24 itself from one year to the next?

25 Q. Yes.

1 A. Yes, that's right, although certainly
2 the insect cycles as well and they've just recently
3 gone through a period where the area of moderate to
4 severe damage has declined quite substantially.

5 Q. My understanding is that in Ontario
6 we have seen rises and then declines in the budworm,
7 somewhat different than what's happened in New
8 Brunswick because in Ontario the bugs can in fact - I
9 don't want to be too colloquial here - eat themselves
10 out?

11 A. Yes.

12 Q. Could you explain what that means,
13 that the bugs actually eat themselves out and that that
14 causes them to drop off, the numbers of them to drop
15 off?

16 A. Well, they feed preferentially on --
17 in Ontario they feed preferentially on balsam fir and
18 on white spruce, those are the two primary hosts, and
19 they feed on the current year's needles primarily;
20 however, when population levels are high and they've
21 exhausted the supply of the current year's needles,
22 then they move to the older needles, which is what we
23 call backfeeding, and under severe infestation
24 conditions they will consume all of the current year's
25 needles as well as much of the previous year's growth

1 as well.

2 Over time a tree such as balsam fir which
3 tends to retain about four or five years' needles is
4 depleted of needles, in fact there are none left on the
5 tree, and the only living tissue left in the crown are
6 those vegetative buds that I referred to this morning,
7 and if the budworm population levels remain high and
8 they consume those vegetative buds as they flush, then
9 in fact they totally defoliate the tree and, as a
10 general observation, balsam fir will withstand about
11 four years -- four to five years of that severe feeding
12 before it dies.

13 Spruce, on the other hand, has a larger
14 complement of needles, just an inherent characteristic
15 of that particular species, and it retains about eight
16 or nine years' of needles, so it takes about eight or
17 nine or ten years for the budworm to exhaust all of the
18 needles on the tree and, consequently, the spruce trees
19 last longer.

20 When that has happened, of course, the
21 two preferred hosts of the budworm are gone,
22 essentially the food resource is gone, and I think
23 budworm specialists speculate that that is one of the
24 major contributing factors to a decline, a localized
25 decline in budworm population levels.

1 If there is a very high predominance of
2 balsam fir in an area, for example, then in fact that
3 population may decline much more rapidly because a
4 larger part of its food supply is exhausted; if there's
5 a larger percentage of spruce, it may sustain itself
6 for a little longer before it declines.

7 Q. If you take your entire forest and
8 you spray it every year so that you are in fact
9 reducing the number of insects at any particular year,
10 when the eggs which have been laid by those insects
11 emerge the next year will there be more food around for
12 them than had you left some of those bugs to nature to
13 allow themselves to eat themselves out, in effect?

14 A. Yes, I think it's a -- if I
15 understand you correctly, Mr. Freidin, I think that's a
16 general proposition that's recognized and in fact it's
17 interesting because the different approaches that were
18 adopted by Nova Scotia and New Brunswick I think are
19 two extremes of that particular situation, in which New
20 Brunswick chose to keep the forest alive, and the
21 criticism of those spraying programs is that they have
22 sustained the forest in a healthy condition which
23 supports large budworm populations and I think that's a
24 reasonably credibly argument; on the other hand, Cape
25 Breton allowed the budworm to -- sorry, Nova Scotia

1 allowed the budworm to run its course on Cape Breton,
2 it ate itself out of house and home and many people
3 will observe quite knowledgeably that the budworm has
4 collapsed on Cape Breton. There is a good reason for
5 that, there's no forest left for them to feed on.

6 So there are two extremes of that
7 situation.

8 Q. All right. So then I put this way:
9 In New Brunswick where they need all the wood and they
10 can't lose any this year or next year, they spray and
11 they keep spraying, they're in a catch-22 position,
12 they're saving the wood but they're also saving the
13 food for next year's insects, so they have got to keep
14 spraying every year to keep retaining the wood?

15 A. In my view their operations are
16 extremely limited, Mr. Freidin, yes.

17 Q. But in Ontario we are somewhere
18 between Nova Scotia and New Brunswick, we have the
19 luxury of having a large enough area that we can in
20 fact allow our budworm -- or large amount of them to
21 progress naturally through the cycle, eat themselves
22 out, and only spray those certain areas to preserve
23 wood which is needed in the near future, first of all,
24 for mill requirements.

25 Do you agree with that so far?

1 A. Yes, I do, I agree with that, again,
2 as a general observation on the Ontario situation and I
3 might just add to that by saying, when I was working
4 with the Ministry of Natural Resources my own feeling
5 was that Ontario could not have been in a better
6 position in the sense that Ontario has a situation in
7 which the Industry does not generally rely heavily on
8 balsam fir and in many situations across the area of
9 the undertaking, in fact, we can allow the budworm to
10 run its course through balsam fir without significantly
11 affecting the wood supply.

12 But on the other hand, recognizing that
13 in designating specific areas - and I mentioned one
14 this morning west of Lake Nipigon, the Black Sturgeon
15 area - if balsam represents a substantial portion of
16 the wood supply in a 20-year planning cycle, then in
17 fact that is an exception to that particular rule.

18 Q. All right. And am I correct, Dean
19 Carrow, that in Ontario the policy in relation to the
20 aerial application of insecticides and the accompanying
21 procedure provides for protection of the commercially
22 operable forest and high value forests and if in fact
23 you need to protect perhaps more than ten years of wood
24 in the future, you can actually -- you can go to the
25 Ministry, rationalize why you've got to spray more, and

1 in fact there have been situations where that has been
2 done and more has been sprayed?

3 A. That's my understanding of the
4 policy.

5 Q. All right. So I think then we have
6 indicated through your evidence why spraying every year
7 in New Brunswick doesn't get rid of the bugs -- the
8 budworm, and I take it then that we've also established
9 that there is a good and valid reason in Ontario for
10 not spraying all insect infestations everywhere they
11 occur?

12 A. Yes, I believe so. It's quite a
13 different situation in terms of wood supply
14 requirements and there are differences in terms of
15 forest composition as well.

16 Q. Thank you.

17 MR. MARTEL: Can I ask a question? With
18 the -- it's about New Brunswick, if you continue to
19 spray, is there a greater risk where you spray annually
20 with chemicals than would be the case in Ontario where
21 you might spray occasionally?

22 DEAN CARROW: A greater risk to what, Mr.
23 Martel?

24 MR. MARTEL: Well, it could be to the
25 water, it could be to any number of things based on a

1 year, if you're spraying year after year?

2 I mean, isn't that one of the problems
3 when they were using Matacil, the public was really
4 getting uptight because it was just too frequent to
5 suit them, from my recollection. I could be wrong.

6 DEAN CARROW: The main criticisms that --
7 or allegations that arose in New Brunswick, Mr. Martel,
8 surrounded the use of fenitrothion and I guess in
9 hindsight the irony of that was that, at the time I was
10 in New Brunswick and associated with the program we
11 were changing the structure of the program, first of
12 all, to include more B.t. in the program; and,
13 secondly, to gradually replace fenitrothion with
14 Matacil because Matacil had been shown to be as
15 effective as fenitrothion and more environmentally
16 benign.

17 MR. MARTEL: But there was a real concern
18 with Matacil at the beginning then; was there not? I
19 can recall that.

20 DEAN CARROW: There was a concern, I
21 would have to check the dates, and I think it was
22 approximately 10 years ago, around at one of the
23 sawmills that was included in the Matacil formulation,
24 I think that was dismissed fairly quickly and, as a
25 matter of fact, when I was with Ministry of Natural

1 Resources I participated in the task force chaired by
2 the Ontario Medical Association to look into the effect
3 of Matacil on human health and that task force
4 concluded that they could see no cause for concern
5 about the use of Matacil with respect to human health.

6 MR. FREIDIN: Q. Could you turn to
7 Exhibit 1206A, Dean Carrow, that is the Report of the
8 9th Annual Forest Pest Control Forum for 1981. Do you
9 have that now?

10 DEAN CARROW: A. Yes, I do.

11 Q. All right. I want to ask you some
12 questions -- well, you were asked a number of questions
13 by Ms. Klerer about the caveat that she referred to. If
14 you look at the second page, which is still the title
15 page--

16 A. Oh yes, right.

17 Q. --of the document, about the report
18 concluding tentative results not sufficiently complete,
19 et cetera. Have you attended proceedings of that
20 forum, Dean Carrow?

21 A. Yes, I have.

22 Q. And am I correct that the information
23 which gets disseminated and discussed there is not
24 restricted to the results of the surveys which are done
25 of the insect situation in the forest, but they are

1 also presentations of scientific papers?

2 A. Yes, that's correct.

3 Q. And am I correct that in many cases
4 the results of those scientific papers are preliminary,
5 they haven't completed it, but people get up and they
6 in fact indicate what the preliminary results are?

7 A. Yes, that's my understanding.

8 Q. Am I correct that those preliminary
9 results and those papers indicating those preliminary
10 results get published as part of the Report of the
11 Forest Pest Control Forum?

12 A. Yes.

13 Q. And would you agree that the
14 scientists who prepare preliminary papers and have them
15 publiced in a document such as this would want there to
16 be a caveat regarding the tentative results, that they
17 would not want their reputations to be put on the line
18 in indicating that something which was in a preliminary
19 paper was in fact taken as being final results of their
20 research?

21 A. Yes, I would say that's one of the
22 reasons for that caveat that's there, Mr. Freidin.

23 There is another very -- perhaps more
24 important reason, and that is that most scientists
25 operate on the principle of publish or perish and if

1 they are going to get their annual salary increase they
2 are going to have to publish in refereed scientific
3 journals.

4 If their results appeared in a
5 publication such as this, it would preclude their being
6 able to publish those same results in a scientific
7 journal. So this document states not for publication
8 so it doesn't jeopardize the ability to publish those
9 elsewhere.

10 Q. Dean Carrow, it is my understanding
11 that that caveat was indeed put there to address the
12 concern of scientists who may have published
13 preliminary results and is not a caveat which is
14 intended to apply to the results of the surveys done by
15 the forest insect and disease survey unit.

16 Can you agree or disagree as to whether
17 my information is correct?

18 A. I would agree generally with that,
19 Mr. Freidin. I think that would be one of the
20 overriding reasons to have that caveat there.

21 I said this morning, I think there are
22 some situations where, from my own experience, because
23 of the timing of that forum, some provincial
24 jurisdictions -- well, I should say that provincial
25 and federal have difficulty getting the data in a final

1 form for the forum as well, and in some cases they want
2 to reserve the right to refine that data before they
3 publish it.

4 Q. Could we agree, Dean Carrow, that if
5 any changes were made from the results which are
6 published in the survey portion of this document that
7 they would be minor in nature?

8 A. Yes, I would agree to that.

9 Q. Do you know Mr. -- Dr. Gordon Howse?

10 A. Yes, I do.

11 Q. Who is he?

12 A. Dr. Howse is head of the Forest
13 Insect and Disease Survey with Forestry Canada at Sault
14 Ste. Marie.

15 Q. And he has been the head of that unit
16 since, I believe, 1977?

17 A. Yes, I think that's approximately the
18 date.

19 Q. Do you believe he would be a good
20 person to indicate the purpose for which that caveat
21 was put there? If we had to sort of choose somebody
22 who might have that kind of information, would he be a
23 good person to ask?

24 A. I think Dr. Howse would be a good
25 person. He is, I think, a regular attendee at the

1 forum and is fully aware of the discussions that go on
2 at that forum.

3 Q. I understand that his unit, in fact,
4 is responsible for collecting the survey results with
5 appear as part of the publication?

6 A. That's -- I'm not sure what the
7 current situation is in Ontario, but certainly that's
8 been the case in the past.

9 Q. Thank you. Let me spend some time
10 with you, Dr. McCormack. I just happen to have a piece
11 of paper here and it is on a matter I think of some
12 interest, Minnesota.

13 You testified as to what the situation
14 was based on your understanding regarding the
15 suspension of the use of herbicides in certain areas of
16 that state and I have certain information, I want to
17 indicate certain facts, as I understand them, and I
18 want you to indicate whether you can agree with those
19 facts or not.

20 MR. FREIDIN: Madam Chair, to the extent
21 that Dr. McCormack cannot agree with these facts, I
22 will be calling a witness to establish the validity of
23 them.

24 Can you agree that on the -- that there
25 are commercial forests on areas referred to as state

1 lands, county lands, industrial forest freehold lands
2 and federal lands in the State of Minnesota? State,
3 country, industrial, forest freehold and federal?

4 DR. McCORMACK: A. Yes, I do,
5 recognizing the term freehold is not usually used in
6 the States.

7 Q. All right.

8 A. Yes, I do.

9 Q. It is my information that the areas
10 of those lands, those different types of forest lands
11 are as follows: State lands, 2.7 million acres; county
12 lands, 2.3 million acres; industrial forest freehold
13 lands, 6.5 million acres; and federal lands,
14 1.2-million acres.

15 Are you able to confirm -- that adds up
16 to 12.7-million acres, if my math is correct, and are
17 you able to confirm the accuracy of that information?

18 A. I am unable to confirm the accuracy
19 of such specific numbers in those categories because I
20 am not that familiar with the details. The ratio
21 sounds reasonable to me.

22 Q. All right. And just to help you with
23 that, the ratios then would be as follows: State
24 lands, 21.3 per cent; county lands, 18.1 per cent;
25 freehold, 51.2 per cent; and federal lands, 9.4 per

1 cent. Is that sort of the ratio that you believe is in
2 the ballpark?

3 A. The ratio sounds reasonable.

4 Q. Thank you. It is my understanding
5 that on state lands there remains an active pesticide
6 program?

7 A. Yes.

8 Q. It is my information that on county
9 lands there is a pesticide use strategy in place
10 similar to that in place on state lands?

11 A. Yes.

12 Q. It is my information that on
13 industrial forest freehold lands there is an active
14 forest herbicide program?

15 A. Yes.

16 Q. You gave evidence as to the situation
17 on the federal lands, which is the 9.4 per cent of the
18 entire forested land of Minnesota. I understand that
19 the reason for the suspension is related to the need to
20 prepare an environmental impact statement; in other
21 words, there is a requirement that they produce an
22 environmental impact statement in relation to the use
23 of herbicides?

24 A. It is my understanding it was a
25 voluntary suspension on the part of the federal people

1 responsible, with part of that suspension to be an
2 activity toward writing the environmental impact
3 statement. I'm not sure which part came first.

4 Q. Right. It being voluntary, it is my
5 understanding as well, Dr. McCormack, that the reason,
6 therefore, is not the result of an admission of any
7 sort, that that suspension was required for
8 environmental or human health reasons?

9 A. Absolutely.

10 Q. In fact, it is my information that
11 the United States Forest Service on federal lands in
12 the State of Minnesota not only treat their seed
13 orchards and their research areas with herbicides, but
14 they also continue to apply herbicides to their
15 campgrounds?

16 A. That is my understanding.

17 Q. Thank you. Mr. Bunce. I really am
18 jumping all over here but I happen to have these
19 highlighted for some reason.

20 Could you please turn to page 69 of the
21 statement of evidence. Do you have that?

22 MR. BUNCE: A. Yes.

23 Q. That is the page where the factors
24 which are taken into consideration in choosing a
25 tending method are listed.

1 You may recall you were cross-examined at
2 some length by Mr. Hanna in relation to those factors.
3 He was asking you about the extent to which you
4 considered the spacial and temporal pattern for
5 non-timber values. Do you recall that line of
6 questioning?

7 A. Yes.

8 Q. Now, am I correct that when foresters
9 talk about a spacial and temporal pattern they are
10 concerned about where the timber is, the commercial
11 crop, and what type it is, the species and the spacial
12 relationship of them. That's the spacial and temporal
13 pattern of the forest that would be a primary concern
14 to a forester who is harvesting timber?

15 A. Yes, I think you would have to
16 include the age structure of the forest as well.

17 Q. And age structure, thank you. A
18 wildlife manager is concerned about the spacial and
19 temporal pattern of the forest, but might look at it a
20 little differently. They are looking for mature timber
21 for winter habitat, for moose perhaps, they are looking
22 for young successional browse, so they look at what the
23 forest has to offer wildlife and they are concerned
24 about the spacial and temporal pattern of it as well?

25 A. I can't speak for a wildlife

1 biologist, but I'm sure that they look at the forest in
2 a different light than I would, as you are saying there
3 for some of those things. They are looking at it for
4 moose habitat or moose management versus timber
5 management, yes.

6 Q. You may not be able to answer this
7 question, you may want to refer it to panel No. 10, but
8 let me ask you. It is my information, would you agree,
9 that the absence of a specific reference to spacial and
10 temporal condition for non-timber values, being listed
11 here on page 69, all right -- you say here:

12 "Proximity to non-timber resource
13 values..."

14 A. Mm-hmm.

15 Q. I'm suggesting to you that the
16 absence of a specific reference to spacial and temporal
17 conditions for non-timber values being listed here does
18 not mean that it is not considered in the planning
19 process, in the timber management planning process?

20 A. Well, non-timber values are
21 definitely examined in the timber management planning
22 process and they are -- because, for example, you would
23 have a planning team of which part of the planning team
24 would be a biologist, a wildlife biologist who would
25 look at the non-timber values from a wildlife

1 biologist's viewpoint and express those concerns in the
2 planning process for the timber management plan.

3 Q. And in the discussions between the
4 wildlife manager and the forester they could agree as
5 to the best decision to satisfy both their needs?

6 A. Yes, in fact, that is exactly what
7 happens. You sit down for many days in each area
8 discussing the needs of both and the compromises that
9 are required for them.

10 Q. Thank you. Dr. McCormack, Madam
11 Chair asked you a question and I didn't quite
12 understand your answer or what was behind her question,
13 so maybe you can explain to me what your answer was.

14 She said: Does tending make a prediction
15 of forest succession more predictable, and you said in
16 some cases yes. Can you explain what you meant?

17 DR. MCCORMACK: A. I don't remember the
18 exact words of my answer. What I meant was when
19 tending is applied to a developing stand, there is an
20 additional level of management applied which enables a
21 manager to have a better idea of what is going to
22 happen as that vegetation continues to develop; in
23 other words, the tending treatment puts some dimensions
24 on the direction of the development of the vegetation.

25 Does that help?

1 Q. It puts some direction on it and, as
2 a result of your knowledge as a scientist, you know
3 what that direction is going to be?

4 A. Exactly. So you can more accurately
5 project what is going to develop on that site.

6 Q. And so this business about being more
7 predictable, you are saying that's because you are able
8 to manipulate it in a way that will get a certain
9 result?

10 A. Exactly. You have imposed a level of
11 management on that development, yes.

12 Q. So that's what you meant during that
13 questioning, that answer was directed to that?

14 A. Yes. I'm sorry it wasn't more clear.

15 Q. Thank you. It may have been clear to
16 everybody else but me.

17 Staying with you, Dr. McCormack. You
18 made a comment or a statement that the least
19 disturbance is best and I assume, Dr. McCormack, that
20 that is a statement which is based on the assumption
21 that nature functions uncontrolled by man in all other
22 respects.

23 I will tell you what I am getting at and
24 I will be perhaps more specific. One of the Industry
25 witnessess in Panel No. 6 was Dr. Methven from the

1 University of New Brunswick, and he indicated that
2 where you have a natural agent of change, such as fire,
3 controlled by man, we have that in Ontario through fire
4 protection, that if you don't replace that disturbance
5 of fire with some other disturbance you could end up
6 with an unhealthy forest, and he indicated in his
7 evidence that the best substitute that he was aware of
8 to replace the disturbance of fire was harvest, we were
9 talking about clearcutting.

10 Are you able, based on your expertise, to
11 agree with Dr. Methven?

12 A. As I understand your description of
13 Dr. Methven's words, I agree with that. I add that
14 when I used my reference to least disturbance there
15 were some qualifiers in there that I think allow me to
16 respond in support of Dr. Methven's statement.

17 Q. Could you elaborate?

18 A. I made reference to things like soil
19 condition, for example, and I did qualify it in a way
20 that I hope indicated that disturbances in part occur
21 in a natural forest processes. When we are
22 regenerating a stand - and in this case I was looking
23 at it post-harvest - I was making reference to further
24 disturbance beyond that which had already taken place,
25 and I think one must distinguish between those.

1 Q. Thank you. Dean Carrow,
2 Interrogatory No. 7, and I'm not too sure whose it is.
3 I think it might be NAN Interrogatory No. 7, Exhibit
4 1202.

5 Do you have that, Dean Carrow?

6 DEAN CARROW: A. Yes. The one that
7 deals with monitoring?

8 Q. That's correct.

9 A. Yes.

10 MS. CRONK: That's No. 4. I'm sorry, to
11 interrupt, that's NAN No. 4. Is that what you wanted,
12 Mr. Freidin?

13 MR. FREIDIN: No, I think it's NAN No. 7:

14 "Please indicate whether the Industry

15 supports

16 continued monitoring of human health

17 effects other

18 than effects on workers involved in

19 spraying the

20 insecticides."

21 MS. CRONK: I beg your pardon, I

22 apologize.

23 MR. FREIDIN: Q. Now, I want to be clear
24 about your answer. You were asked by Ms. Kleer: Does
25 Industry participate in such monitoring, and my notes

1 indicate that your answer was as follows, Dean Carrow:

2 That at the present time the

3 responsibility for

4 application is MNR's but certainly this

5 answer

6 supports continued monitoring in some

7 cases by the

8 Ministry of Environment and the Ministry

9 of

10 Health.

11 Now, you indicated that there was a
12 responsibility on the Ministry of Natural Resources for
13 application, I take that to mean the actual spraying of
14 the insecticide?

15 DEAN CARROW: A. Yes.

16 Q. And I take it, Dean Carrow, that you
17 are not, on behalf of the Industry, suggesting or
18 taking the position that the responsibility for the
19 monitoring of human health effects of insecticides
20 falls to the Ministry of Natural Resources; are you?

21 A. No.

22 Q. Thank you.

23 A. No, we're not.

24 Q. Mr. Bunce, I just want to cover this
25 off. You were asked by Ms. Kleer who decides what

1 vegetation management will occur in the field, and she
2 said: is it the forester, and you said the choice of
3 tending technique is made by the timber manager who is
4 writing the timber management plan and the AWS.

5 And would you agree with me that the
6 forester doesn't do that alone; just as he may have
7 consultation with the wildlife person preparing the
8 spacial and temporal pattern of the forest, the
9 wildlife manager or representative on the planning team
10 could have input in relation to the tending technique
11 as well.

12 MR. BUNCE: A. I'm not sure that I
13 answered that question.

14 MR. TOMCHICK: A. I answered that
15 question.

16 Q. I'm sorry. Well, can you answer the
17 question without me repeating it?

18 A. No, could you repeat the last part of
19 it.

20 Q. All right. Well, it's my
21 understanding that the wildlife manager can have input
22 during timber management planning as to the tending
23 technique in a discussion with the forester, just as
24 much as that wildlife manager can have input in the
25 spacial and temporal pattern of the forest?

1 A. In a general way, yes, however once a
2 decision has been made by the planning team, if an area
3 is to be tended - and now we get into areas of concern
4 and normal operations - but generally, once that
5 decision has been made by the planning team whether an
6 area can be tended, unless there is circumstances that
7 are present or a value present where some kind of
8 mitigating measure has to be taken or some kind of
9 modified measure or modified technique has to be used,
10 the forester would make the decision after that as to
11 what technique would be used in normal operations.

12 Q. Okay, thank you.

13 Dr. McCormack, could you -- hold on, I've
14 got to find out which exhibit I want to refer you to.
15 Forests for Tomorrow Interrogatory No. 13, which I
16 guess was part of Exhibit 1136.

17 DR. MCCORMACK: A. No. 13?

18 Q. Yes.

19 A. This refers to Table 8 in the
20 statement of evidence, I believe.

21 MR. FREIDIN: Well, as soon as Mr.
22 Churcher finds me my copy, I'll -- if I may just have
23 one moment, please.

24 ---Discussion off the record

25 MR. FREIDIN: Q. Now, Mr. Castrilli was

1 asking questions about this particular interrogatory
2 and you may recall that he --

3 MR. MARTEL: Whereabouts is it, Mr.
4 Freidin, in this bundle of documents?

5 MR. FREIDIN: I don't know, I don't have
6 the exhibit, I was working from my copies of the --

7 MR. TOMCHICK: 1192.

8 FREIDIN: 1192?

9 MR. TOMCHICK: Part of 1192.

10 MR. FREIDIN: Part of 1192.

11 MADAM CHAIR: Thank you.

12 MR. FREIDIN: I also lose the paper war,
13 Mr. Martel.

14 Q. Page 14.

15 DR. MCCORMACK: A. This is the
16 interrogatory that refers to Table 8 on page 128 of our
17 statement of evidence where Mr. Castrilli asked for
18 data that were the basis for the figures in that table.

19 Q. Right. The question was: What was
20 the total volume of all species of trees on the control
21 and sprayed areas?

22 A. That's correct.

23 Q. Okay. Now, Mr. Castrilli spent some
24 time with you, particularly in relation to this
25 interrogatory, talking about what were the total

1 volumes of wood fiber on the site in the situation
2 where you had releases and one where you didn't have
3 releases, and I took it from his questioning that he
4 was suggesting that the Roe study, which is the very
5 first one referred to--

6 A. Yes.

7 Q. --was indicating somehow that there
8 was more volume on the control site than there was on
9 the areas which were sprayed?

10 A. Mr. Castrilli was referring to no
11 release as the control site and looking at the total
12 column under 1949 which was the last period of
13 measurement reading the figure 31.8 as a higher volume
14 of the partial release and full release treatments as
15 listed, yes.

16 Q. Now, am I correct that the 1931
17 figures for total volume--

18 A. Yes?

19 Q. --refer to the volume on those areas
20 before any of them received a herbicide treatment?

21 A. That is correct.

22 Q. So that the partial release area or
23 total volume of 2.8 was just the total starting volume
24 before anything was sprayed on the block which was
25 going to be partially released?

1 A. That is correct.

2 Q. And this is the same for full
3 release?

4 A. Yes.

5 Q. So that you started with a control
6 block or a no release block which had substantially
7 more volume to start with?

8 A. That was what I attempted to explain
9 to Mr. Castrilli.

10 Q. All right.

11 A. So that one looks at the volume gain
12 following treatment to determine the success of the
13 treatment; therefore, a subtraction needs to be made
14 and, when that is done, then the release treatments
15 clearly have gained more volume.

16 Q. And that is really the only
17 meaningful conclusion you can draw from those numbers
18 if you're concerned about the effects of herbicides,
19 that you get more volume on the released areas as
20 opposed to the amount of increased volume on a
21 non-released area?

22 A. There is clearly a benefit for total
23 volume as well as volume gain of the chosen crop trees
24 on those treatments, yes.

25 Q. I'm going to indicate to you what

1 I -- well, if Mr. Castrilli through his
2 cross-examination was suggesting that one might
3 consider not releasing an area because it might result
4 in more total volume on a site than would occur if you
5 released it, and if one accepts the proposition that
6 the species and the things which made up the wood fiber
7 would be varied on the unreleased site, do you believe
8 it would be appropriate as a management technique to
9 ignore the species of wood on the uncontrolled area and
10 just say:

11 Well, I've got more wood volume, more
12 wood fiber, so I'll take that, even though I may get
13 less volume over here but it's going to be a good crop
14 tree. Does that make any sense to you?

15 A. Absolutely not.

16 Q. Mr. Castrilli also seemed to suggest
17 in his cross-examination that perhaps because when you
18 spray herbicides you might release a crop tree, you may
19 also release balsam fir, which we've heard is not the
20 greatest species if you're concerned about budworm, and
21 balsam fir is not a desirable species.

22 Does it make any sense to you to not
23 spray your crop trees just so you're not going to
24 release some balsam fir?

25 A. Not at all. And if I may, I would

1 add a further point, that if one were to incorporate
2 2,4-D properly timed in their treatment they could at
3 the same time suppress some of the balsam fir to
4 benefit the other crop species present.

5 Q. Thank you. I'm not sure who can
6 answer this, maybe none of the panel members can, but
7 in terms -- it is my information that clearcutting and
8 the application of herbicides occurs in the Great
9 Lakes/St. Lawrence Forest not only in the boreal
10 forest.

11 Can anybody on the panel confirm that my
12 information is correct?

13 MR. TOMCHICK: A. I can't.

14 MR. BUNCE: A. If we can confirm whether
15 I'm in the transition zone of the boreal forest or in
16 the Great Lakes/St. Lawrence--

17 Q. Well, all right, wherever you are,
18 Mr. Bunce, we'll look at the map.

19 A. --you'll find that we clearcut and
20 tend.

21 Q. All right. And in Algonquin Region,
22 can anybody confirm that clearcutting and the
23 application of herbicides occurs in the Algonquin
24 Region of the Ministry of Natural Resources?

25 It's my information that it does.

1 A. I have never worked in Algonquin
2 Region, so I couldn't comment.

3 Q. Okay, thank you. And can anybody
4 confirm my information that in the management of red
5 pine in the Great Lakes/St. Lawrence Forest,
6 clearcutting and the application of herbicides is a
7 procedure which is used?

8 MR. TOMCHICK: A. I can't.

9 Q. Thank you.

10 Dr. McCormack, during the
11 cross-examination by Mr. Castrilli you were asked some
12 questions about the timing that might be appropriate
13 for the application of herbicides.

14 And he asked you: What's the appropriate
15 timing for the application of each herbicide, and your
16 answer is: Depending on the specific location the use
17 of these chemicals could take place over months, but
18 must realize that the phenological characteristics can
19 vary and based on site - and I may not get all this
20 down correctly, you correct me - and, therefore, late
21 July through September depending on the conditions,
22 realizing conditions may occur which would allow you to
23 carry out operations outside of those time frames.

24 And I just wanted to ask you: Would it
25 be appropriate or inappropriate to have a rule or a

1 limitation that says herbicides can only be applied
2 between July and September?

3 A. I would certainly hope not because of
4 what was stated earlier and because of options that are
5 there that would be excluded from a manager's set of
6 choices.

7 Q. All right. As I understand your
8 evidence, there are circumstances in which you would
9 have to spray outside those areas, for site prep for
10 sure?

11 A. I think I did mention site
12 preparation, there are other reasons as well.

13 Q. All right. There are some situations
14 where you would want to spray outside that period for
15 release as well?

16 A. Yes.

17 Q. Thank you.

18 A. Emphasizing it could be at either end
19 of that range, early or late.

20 Q. Thank you. Dr. McCormack, Mr. Hanna
21 asked you some questions about objectives, he said:
22 Clear objective or end point - he's just tell you - I
23 meant it to mean a given forest structure, species
24 composition, spacial context or plan, is that what you
25 understood to be an end point, and your answer was:

1 Yes, that would be one way to specify an objective.

2 I take it from your answer, Dr.

3 McCormack, that there are other ways of specifying an
4 objective?

5 A. Oh, I think so and I left that open
6 because it's not for me to determine how a given
7 manager determines what his objectives are.

8 Q. Thank you. That's a matter that
9 leave to the planners and the experts in planning
10 systems?

11 A. I'm sure there are many ways to
12 define objectives.

13 Q. Thank you. I may be hesitating, but
14 we're moving right along. It may not seem like it to
15 everybody.

16 Dr. McCormack, Mr. Hanna was asking you
17 about the possible significance of getting more
18 herbicides registered for use in forestry, and it's my
19 understanding that one of your positions is that it
20 would be desirable, that by getting more herbicides
21 registered there is a possibility of being able to be
22 more selective in which species of vegetation actually
23 get affected by the herbicide; is that correct?

24 A. That's correct.

25 Q. So that if you get more herbicides

1 and you could actually be more precise or have a
2 prescription which was more -- had more finesse instead
3 of perhaps affecting five types of vegetation when you
4 only wanted two, you might be able to just get the two?

5 A. I often equate this to going to a
6 physician with an illness and hope he has more than a
7 bottle of aspirin in his bag of tricks, yes.

8 Q. Thank you. Now, it seemed to me that
9 Mr. Hanna may have a concern about the effects that
10 herbicides might have on natural succession. Did you
11 understand his questioning of you to indicate that he
12 was concerned that by applying herbicides you may
13 disrupt the natural success which would occur had man
14 not intervened?

15 A. Perhaps I missed that point. It's a
16 little difficult for me to envision totally natural
17 succession. Since these herbicides are usually going
18 down on an area that has been harvested and possibly
19 planted; an intervention has already taken place, and
20 one must deal with the conditions which are there at
21 the time tending takes place.

22 Q. All right. Well, let's assume that
23 you start with a situation after you've harvested, so
24 you've got that disturbance, if you're concerned about
25 succession occurring naturally from that point on, it

1 seems to me that one would be less concerned about
2 disrupting natural succession; if you had a herbicide
3 that could be very precise, you wouldn't be more
4 concerned about natural succession in that situation?

5 A. The way I see this, Mr. Freidin, is
6 that with properly applied herbicide technology a
7 manager is actually able to put the developing
8 vegetation more closely on track to develop into what
9 might have been there naturally than if left untended
10 following harvest, and with more herbicides a manager
11 is better able to accomplish that.

12 Q. Thank you. Dean Carrow, I want to go
13 back to you. You defined in your evidence the three
14 different types of control; outbreak control,
15 containment and foliage protection.

16 DEAN CARROW: A. Yes, that's correct.

17 Q. And did I understand your evidence to
18 be today that in terms of outbreak control it is your
19 opinion that you need chemicals to effectively have
20 outbreak control?

21 A. In my view there are certain
22 situations that arise in the area of the undertaking
23 that absolutely require chemicals to achieve outbreak
24 control.

25 Q. All right. And in the situation of

1 containment and foliage protection, I understand your
2 evidence to be that there are situations where you can
3 achieve control without chemicals?

4 A. You can achieve adequate protection
5 or -- that's right.

6 Q. And we can agree that most of the
7 programs being conducted in Ontario at the present time
8 are foliage protection?

9 A. Yes, certainly at the present time;
10 that is, 1989-90, that's correct.

11 Q. And, therefore, if we were looking at
12 those programs, the amount of insect or larvae
13 mortality is not the measure or the standard to judge
14 success?

15 A. If the designated purpose of the
16 program is foliage protection, which is that third
17 option, then certainly larvae mortality is a secondary
18 consideration.

19 Q. Okay. Could you turn to page 171 of
20 the witness statement, please.

21 MADAM CHAIR: Which page is that, Mr.
22 Freidin?

23 MR. FREIDIN: Page 171.

24 MADAM CHAIR: Thank you.

25 MR. FREIDIN: Q. Do you have that, Dean

1 Carrow?

2 DEAN CARROW: A. Yes, I do.

3 Q. I direct you to the last full
4 paragraph on the page where you refer to the B.t.
5 program for '86 and '87. It's my information that the
6 program in those years was a program of foliage
7 protection. Can you confirm that that is --

8 A. Are you referring to '86 and '87?

9 Q. Yes.

10 A. I would accept that as an objective,
11 Mr. Freidin, although I haven't seen any specific
12 statement to that effect, but I would accept it in view
13 of the circumstances and the size of the problem, that
14 that was an the objective, yes.

15 Q. Okay. Well, having acknowledged
16 that, if you look at the last three lines after
17 indicating the number of applications of B.t. that took
18 place, the comment is made that:

19 "Even so...", even though there was more
20 than the single application,

21 "...sampling showed that these treatments
22 were successful for insect control 90 per
23 cent plus population reduction not only
24 slightly more than half of the treated
25 area."

1 I just want to clarify. You've made a
2 reference here to the standard for outbreak control,
3 but I think we have agreed that if in fact it was a
4 foliage protection program the method that you would
5 use to measure how well you had done would not be to
6 look at population control, you would be looking at
7 foliage protection?

8 A. Yes. I can appreciate your concern
9 over that particular wording, and I guess if I were to
10 write that sentence again, Mr. Freidin, I'd write it a
11 little differently.

12 I think what I was trying to illustrate
13 in that evidence was that in fact the Ministry has in
14 those years used either two or three applications of
15 B.t., which is an exceptionally high rate of
16 application, and that even with that extraordinary rate
17 of application, for instance, it was very difficult to
18 suppress those populations significantly.

19 So that, again, it's meant to illustrate
20 that with that particular -- with the manager being
21 constrained to that particular technology, he's not
22 able to achieve significant population reduction, even
23 though in those cases he may be able to achieve foliage
24 protection.

25 Q. I take it then that really, although

1 it wasn't perhaps the intention, that that particular
2 fact situation supports the position that you indicated
3 earlier, that in some circumstances B.t. will not work
4 for outbreak control and you have got to use chemicals?

5 A. That was the point of that particular
6 discussion, was that with that particular technology
7 you couldn't achieve outbreak control.

8 Q. All right.

9 MR. FREIDIN: And, Madam Chair, I just
10 indicate that in Exhibit 659, at page 173, there's an
11 indication that the spray programs for the two years
12 that I refer to -- pardon me, 1987 and in the previous
13 year was in fact foliage protection.

14 Q. Turn to page 179, please. Do you
15 have that?

16 DEAN CARROW: A. Yes, I do.

17 Q. The first full paragraph, first
18 sentence states:

19 "Foliage protection is necessary to keep
20 insect attack trees in a living condition
21 and to maintain annual growth on the
22 trees."

23 I take it in that case the word growth is
24 referring to increment?

25 A. Yes.

1 Q. The addition of volume?

2 A. Yes, that's right.

3 Q. If you go down in the next sentence
4 where there is reference to -- well, it says the level
5 of -- it refers to:

6 "50 to 60 per cent preservation of the
7 current year's growth."

8 In that case, am I correct, that the word
9 growth should be interpreted as being foliage; you are
10 not referring to increment in that particular portion,
11 you're talking about the foliage for that particular
12 year?

13 A. It says specifically preservation of
14 the current year's growth, and by that I mean the
15 current year's needles, not volume increment.

16 Q. Right. So growth is used in two
17 different ways in that particular paragraph?

18 A. You're right.

19 Q. Okay. Now, you indicated in your
20 evidence that the purpose of foliage protection in
21 Ontario is to keep the trees alive, and I wanted to ask
22 you some questions about your evidence about the need
23 for a standard for foliage protection in Ontario.

24 I cross-examined Panel No. 8, the renewal
25 panel for Industry, at some length and I believe that

1 to the NAN they agreed that when you are reporting
2 information to the public that reporting the
3 achieved -- a certain percentage of anything - we were
4 talking survival, we were talking about stocking - that
5 it's confusing for the public to understand or get
6 their minds around those sorts of concepts because you
7 have to know a lot more about the subject matter than
8 just looking at a percentage on a piece of paper.

9 Is that a phenomenon that you have sort
10 of encountered generally when you have tried to express
11 what forestry is all about, if you're using
12 percentages?

13 A. I can't say that I would agree with
14 that as a generalization and in the context of survival
15 of seedlings, for example, just as an illustration, my
16 experience is the public can understand what 50 per
17 cent survival means.

18 MS. CRONK: I have to say, Madam Chair,
19 Mr. Martel, despite the lateness of the hour that
20 that's not precisely my recollection of how that
21 evidence ended up at the completion of the renewal
22 panel's evidence.

23 I recall a question of that kind - I
24 don't have the transcripts here - being specifically
25 put with respect to, you recall, second-year survival

1 data and a percentage based on that.

2 I don't want to get into an argument, but
3 I just put on the record that I don't accept that that
4 is how the evidence concluded.

5 MR. FREIDIN: Q. Would you agree, Dean
6 Carrow, that a standard implies that it can be met.
7 The public look at a standard, it says 60 per cent
8 foliage protection, that indicates to the public that
9 if you're doing a good job you should be meeting that
10 standard?

11 DEAN CARROW: A. Yes, I think that's
12 implicit in that.

13 Q. Would you agree with me, and I think
14 you have indicated in your own evidence, that what is
15 acceptable foliage protection in any given year -
16 acceptable from a management point of view - depends on
17 the population dynamics; that is, you can't say that
18 foliage protection this year -- you could say -- if we
19 got 30 per cent protection this year, that might be
20 great having regard to all the facts?

21 A. I think if you're referring to
22 evidence that I think I presented earlier today, Mr.
23 Freidin, in response to Ms. Kleer's question, I think
24 the point I was trying to make was that I could very
25 readily conceive of a number of different numerical

1 standards based on the pest, first of all, whether it's
2 gypsy moth, whether it's spruce budworm, whatever, but
3 perhaps more importantly based on the particular nature
4 of the forest stand that was being protected,
5 recognizing a mature -- recognizing that, for example,
6 a mature forest that is ranked as a commercially
7 operable or commercial forest that's within a 20-year
8 management planning cycle and scheduled for harvesting
9 might require a different standard of protection than a
10 seed production area, for example, in which the
11 management objective of that particular area is quite
12 different from a mature stand or indeed a young
13 plantation where the objective was to keep it in a
14 vigorous healthy growing state, putting on optimal
15 volume increment year-by-year.

16 So that the point I was trying to make in
17 response to that was that the standard -- I could
18 easily envisage a situation in which the standard would
19 be developed to be suitable to the particular
20 circumstance, the particular management objective for
21 that species in that particular stand or that
22 particular area.

23 Q. But I understood your evidence to be
24 that one of the reasons you thought that there should
25 be a standard was for accountability purposes?

1 A. Yes.

2 Q. And I take it that that would include
3 accountability to the public whose forests are actually
4 being managed, some way of communicating to them how
5 well you're doing in your protection program?

6 A. Yes, and whose funds are being spent.

7 Q. All right. And what I hear you
8 saying is: It might in fact be necessary to go to the
9 public, and they may have to see a form which had a
10 different percentage -- a whole number of percentages,
11 some saying 20 per cent foliage protection, some saying
12 60, some saying 80, some you may want a hundred because
13 you're trying to protect the buds in a seed orchard,
14 they would have a whole range of percentages; that is
15 what would result if your proposal was adopted; we
16 agree on that?

17 A. I don't agree with that
18 interpretation of what I'm suggesting, Mr. Freidin.

19 Q. Why not, why wouldn't you...

20 A. Because I don't at all envisage a
21 situation in which that level of detail would have to
22 be presented to the public. But let me just elaborate
23 on the background of this a bit, if I could.

24 I've been involved in these types of
25 programs for almost 20 years now across Canada and I've

1 lived through periods where, in fact, public reports
2 annually - and this is not exclusive to Ontario, I
3 don't mean to suggest that whatsoever, this is a
4 phenomenon we've seen all across Canada - in which
5 public reports had wording to the effect that results
6 of spraying this year were generally satisfactory,
7 period. That's the sum and substance of the program
8 that may have cost 10 to \$15-million.

9 And I've lived through circumstances
10 personally where a lot of members of the public quite
11 rightly want to know what you mean by generally
12 satisfactory when you're spending 10 to \$15-million. I
13 think that's a valid question.

14 Q. Right. And I agree that it's a valid
15 question. What I'm just trying to explore with you now
16 is, how do you deal with that valid question and there
17 may be various alternative ways of doing it, and I'm
18 suggesting to you that to some members of the public at
19 least, would you agree, that if you go to them and you
20 start off by saying: The standard for foliage
21 protection is 50 per cent, some of them are going to
22 say: Why not a hundred per cent, why not 80 per cent,
23 and without some more information they won't really
24 understand why 50 per cent in that particular year was
25 good; agreed?

1 A. We've suggested in our evidence, Mr.
2 Freidin, that in fact appropriate research be
3 undertaken in the Province of Ontario to establish what
4 is considered an appropriate standard for our
5 conditions in Ontario, recognizing that the standards
6 that have been chosen by New Brunswick are rather
7 arbitrary, and in fact we have very little basis right
8 now for -- very little scientific basis for saying that
9 50 per cent or 60 per cent are the magic answer.

10 Q. But would you agree with me that even
11 if you came up with a percentage as a result of that
12 process, you would still have to communicate to the
13 public, they would have to accept that that percentage
14 was reasonable.

15 I mean, the public might very well be a
16 bunch of doubting Thomases in some case and say: Come
17 on, they're just trying to pull a fast one here, how
18 could 50 per cent be good? You may have worked
19 yourself to death and come up with the best percentage
20 in the world, but it might be a very difficult thing to
21 communicate to the public why 50 per cent was a good
22 standard. Can we agree on that?

23 A. No, I wouldn't agree with that at
24 all.

25 Q. Okay.

1 A. I think the suggestion here is that
2 the appropriate research be undertaken in the field to
3 establish whether, for example, 50 per cent is an
4 appropriate level of foliage protection for the
5 Province of Ontario for balsam fir or spruce.

6 Q. How do you convince the public that
7 that percentage, when you report -- when you got 50 per
8 cent, how would you get the public to accept that that
9 was a good result?

10 A. That 50 per cent was a credible
11 standard; is that what you're saying?

12 Q. How would they know that?

13 A. I'm missing the point of your
14 questioning here, because I have said that appropriate
15 research should be undertaken to validate that.

16 Q. All right. If appropriate research
17 is done from your point of view because you were
18 involved in the district meeting because you're a
19 professional, you would know 50 per cent is good.

20 A. Or whatever number came up, yes.

21 Q. So I guess you could go to the public
22 and you could say: Here's the standard, it was
23 developed as a result of a lot of research by a lot of
24 experts and, therefore, if we tell you 50 per cent is
25 good, then you should believe us.

1 And is it sort of through that mechanism
2 that you would hope the public would accept 50 per cent
3 as being reasonable?

4 A. I would think so, at least you would
5 have validation for that particular number.

6 Q. Now, in a particular year you may
7 have set the standard at 50 - as you've said, New
8 Brunswick has a set standard, 60 per cent for one
9 species and 50 for the other - and I think we have
10 agreed that in some years that may be the standard, but
11 if you got 20 per cent protection it would be great.

12 Now, what do you tell the public in that
13 situation? You've told them you did all this research
14 and 60 per cent was great, now you're going back to
15 them and saying: We got 20 per cent and that's
16 terrific; isn't that going to be confusing?

17 MR. TOMCHICK: A. I think that I could
18 sort of straighten this out in my mind. If you had a
19 standard of 20 per cent and you achieved that in 100
20 per cent of the cases, you had a successful program and
21 that would be the way that you'd communicate to the
22 public, the successfulness of your program.

23 If the number of plots or however you
24 wanted to measure your program, if they met that
25 standard and they all met that standard, you had a one

1 hundred per cent successful standard.

2 Q. But, Mr. Tomchick, just taking up
3 that example, if you had an objective of 20 per cent
4 but it was such a bad infestation you thought: Boy, if
5 we can get it on 75 per cent of the area that's
6 wonderful, now you're going to be in a situation where
7 you go to the public and say: The objective was to get
8 20 per cent on 75 per cent of the area and you're going
9 to tell them that that was good.

10 I'm suggesting to you that when you go to
11 the public and you start throwing these numbers around
12 and saying: Boy, we got 20 per cent on 75 per cent of
13 the area, they'll say: Well then, why didn't you get
14 it on a hundred per cent of the area? Or if you say:
15 We got 20 per cent on a hundred per cent of the area,
16 they'll say: Why didn't you get 50 per cent, and it's
17 not an easy thing to get the public to buy into or to
18 use a number as a way of communicating to the public.

19 Let me tell you where I'm going, and I
20 think I've probably explored this enough.

21 And suggest to you that there is another
22 approach, and another approach might be: If the public
23 knew that the assessment -- knew and understood that
24 the assessment which was being done was being done by
25 someone independent of the manager and that independent

1 person said to the public: We've looked at what
2 they've done and we believe they have done a good job.
3 I would suggest to you that if the public were educated
4 to be trustful of that independent auditor, that person
5 saying that the job was done well or it was done
6 poorly, perhaps indicating what sort of problems there
7 were, would be a sufficient way of addressing the
8 public's concern to know how well the program had been
9 carried out.

10 Would you agree with that?

11 DEAN CARROW: A. That's not my
12 experience, Mr. Freidin. Quite frankly, having worked
13 in Ontario and in New Brunswick in very close contact
14 with budworm spraying programs which increasingly are
15 controversial programs, there is a high degree of
16 public concern about spraying in the forest
17 environment, as we all know.

18 I would say it's fair to say that level
19 of public concern is probably increasing annually and
20 in fact, in my own experience, there have been very,
21 very serious challenges made to the justification for
22 carrying out a program based on the lack of numerical
23 evidence for what that program did. And I can tell you
24 from personal experience, it is extremely embarrassing
25 in that situation to have to put before those groups or

1 those people a document that says only: Results in
2 this year were generally good or satisfactory. It
3 doesn't take very much imagination for that person to
4 say: What do you mean by good, what do you mean by
5 satisfactory?

6 And I'm afraid that we've moved beyond
7 that era in Canada when the public is willing to accept
8 that type of evaluation, particularly when we're
9 dealing with programs that are as contentious as
10 spraying programs, particularly when we're dealing with
11 programs that are increasingly costly - and we're
12 talking about multi-million dollar programs now -
13 programs that are technically complex as well, and I
14 think quite rightly people are asking: What is the
15 justification for carrying that out?

16 I think we have seen a parallel line of
17 logic with respect to herbicide use. We've heard much
18 evidence throughout the presentation of this panel:
19 What is the justification for the use of herbicides,
20 where are the benefits? And in fact we've been short
21 on numerical or quantitative data with respect to the
22 effectiveness of spray programs, again throughout
23 eastern Canada not just Ontario.

24 MR. MARTEL: Can I ask a question?
25 Wouldn't you be better off if you did in fact have a

1 number and gave an honest explanation to the public
2 when you didn't reach that number? They would be much
3 more ready to accept that you might have missed it even
4 by 20 per cent if they know that the reasons that are
5 being given are logical as opposed to trying to feel
6 that they are being conned.

7 DEAN CARROW: I would agree, Mr. Martel,
8 and I fact I think somewhere in the evidence or in the
9 oral evidence I gave I made particular reference to the
10 New Brunswick situation in which, given the fact that
11 they use that arbitrary standard of 50 to 60 per cent,
12 one thing they have used that standard for in their
13 reports is to point out the difference in the success
14 rate between B.t and fenitrothion, because they've been
15 able to validate that quantitatively and say for
16 fenitrothion there was, for example, 75 per cent
17 success and for B.t there was 38 per cent success in
18 achieving the standard.

19 That's a much more credible argument to
20 me than for someone to simply come forward and say
21 chemicals are better than B.t. based on a very
22 subjective evaluation. At least it lends a measure of
23 credibility to it. And I think I've never encountered
24 any difficulty at all with an agency standing up
25 publicly and saying: We didn't meet our target in all

1 cases, we have a 20 per cent failure rate, that in fact
2 encourages you to identify why, why you had a 20 per
3 cent failure rate and hopefully next year improve the
4 picture.

5 MR. MARTEL: It's called accountability;
6 isn't it?

7 DEAN CARROW: Yes, I think it is a very
8 important principal.

9 MR. FREIDIN: Q. I'm going to come back
10 to this business about an independent auditor, but I
11 just want to see if I can cover off one other area
12 before we break.

13 Can you turn to Table 3 on page 175 of
14 the statement of evidence. Page 13, Table 13, I'm
15 sorry. Do you have that, Dean Carrow?

16 DEAN CARROW: A. Yes, I do.

17 Q. My notes indicate that it was your
18 evidence and the evidence of others that there were no
19 control agents for 12 of the 15 pests in Table No. 13,
20 and I am assuming that you mean by that that there are
21 no control agents which can be applied aerially for 12
22 of the 15 pests in Table 13.

23 And I say that, I assume that is what you
24 meant because it is my information that chemical
25 insecticides can be and are applied from the ground as

1 insecticides in this province today.

2 So just so you understand what I'm
3 saying, I'm assuming that you were saying that there
4 were no control agents, I agree that in terms of
5 chemicals you can't spray them from the air in relation
6 to those pests, but some of those pests can be dealt
7 with through the application of chemicals from the
8 ground?

9 A. Well, in the first place, Mr.
10 Freidin, the pesticides which are listed in Table 13 of
11 of course apply to the pests that are listed in Table
12 12, all right, so that what I was saying in the
13 evidence was that of the 15 pests listed in Table 12
14 there were biological controls available for only three
15 of them.

16 Q. Right.

17 A. Which leaves 12 pests with no
18 biological controls approved.

19 Now, with respect to the method of
20 application, I didn't make a distinction in the
21 evidence because I have not understood that there was
22 any distinction made by the Minister in the
23 announcements made publicly since 1985 or '86 and in
24 fact the copy of Hansard that Ms. Kleer provided dated
25 October, 1989 made no such distinction about aerial

1 versus ground application.

2 Q. If I might direct your attention to
3 Exhibit 635, which is the May 7th, 1985 statement.

4 MS. CRONK: Just a minute, I'll get it
5 for you.

6 DEAN CARROW: Yes, I have that.

7 MR. FREIDIN: Q. And I'm not attempting
8 to be critical in any way, Dean Carrow, I'm trying to
9 make sure that the evidence which is before the Board
10 is accurate and that people understand the situation.

11 You would agree with me that in the first
12 two paragraphs of that exhibit the reference is to
13 aerial spraying, they're talking about aerial spraying
14 of a biological insecticide in any event?

15 A. Is this 635?

16 Q. Yes.

17 A. Yes, I would agree that it says
18 aerial spraying, that's right.

19 Q. If we go to the third page in the
20 first full paragraph, in the third last line it says:

21 "Mr. Harris..." who was the Minister,
22 "...said in a small number of situations
23 we will be using ground treatment with
24 other insecticides as usual."

25 Now, I'm not too sure whether it really

1 makes a difference what these words -- how they are
2 interpreted right now as you and I read them. It is my
3 information that chemical insecticides are used in this
4 province, and have been since 1985, although they have
5 not been aerially applied, and if you can't confirm
6 that that's fine, but if you can, it would be
7 appreciated.

8 A. No, I can't confirm it because my
9 understanding was that it was a ban on the use of
10 chemicals generally.

11 Q. All right. Can anybody on the panel
12 from Industry indicate whether my -- well, is anybody
13 on the panel aware of the application of chemical
14 insecticides from the ground since 1985.

15 MR. SMITH: A. I'm aware of the Tree
16 Improvement Project that was carried or has been
17 carried out over the last two or three years in the
18 Sioux Lookout area of Ontario in which they were
19 treating weevil damage with chemicals.

20 Q. This is the one I think you referred
21 to earlier today, you mentioned that name.

22 A. Exactly.

23 Q. All right. And Anybody else?

24 (no response)

25 Okay.

1 MR. FREIDIN: Madam Chairman, I think it
2 has been a long day so far. I'm wondering whether we
3 could, rather than come back, could we break for 10
4 minutes, I can take a look at my notes.

5 I might be able to say that I can finish
6 tomorrow in an hour or something, and I hate to have
7 everybody come back and me finish in an hour if people
8 don't have to stay tonight.

9 So could I have ten minutes?

10 MADAM CHAIR: Yes, Mr. Freidin.

11 MR. FREIDIN: Thank you.

12 ---Recess taken at 6:05 p.m.

13 ---On resuming at 6:15 p.m.

14 MADAM CHAIR: Please be seated.

15 MR. FREIDIN: I have good news and bad
16 news, I'll start with the bad news: I'm not finished,
17 the good news is: We can go for dinner, because I'll
18 finish early tomorrow.

19 MADAM CHAIR: All right, good.

20 MR. FREIDIN: I have spoken to counsel
21 and we figure if I stop -- or finish before 11:00, we
22 can finish with ease and I don't think I'll take until
23 11:00, so...

24 MADAM CHAIR: All right. And then, Ms.
25 Cronk, you will want the lunch hour to go over --

1 MS. CRONK: Yes, thank you. Actually
2 based on Ms. Seaborn's estimate she won't be finished
3 before lunch, if the Board rises at its normal time.

4 MADAM CHAIR: Well, we can be flexible
5 tomorrow, we can have a later lunch so that you could
6 take that --

7 MS. CRONK: Thank you, I would be
8 grateful. Thank you very much.

9 MS. SEABORN: Yes. I would be quite
10 happy, Madam Chair, to do my cross-examination in one
11 block and it may mean going a little bit past 12:00.

12 MADAM CHAIR: That's fine. Thank you
13 very much.

14 We will adjourn for the evening now and
15 come back at 8:30.

16 MS. CRONK: Thank you.

17 MADAM CHAIR: And witnesses, before you
18 go, I wanted to say, our discussion this afternoon
19 about scheduling has no bearing whatsoever on your
20 participation at the hearing. I don't want you to feel
21 that in some way you're involved in any of the
22 mechanics of how the hearing goes.

23 The Board's very appreciative of the
24 efforts. We understand that witnesses have the hardest
25 job in this hearing and we appreciate your hard work

1 and participation.

2 ---Whereupon the hearing adjourned at 6:20 p.m., to be
3 reconvened on Friday, June 1st, 1990, commencing at
4 8:30 a.m.

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